Thank you Mr. J. I. Kennedy. Your invitation to romp and play at the Annual Picnic of the Northwestern Telephone Company at Freeport, Ill., on August 27 is something we treasure. Although we did not get there last year we hope to this time. We still hear about the 1937 party and are herewith reserving a drumstick.

▼

Officials of the National Association really flash a wonderful smile when they discuss the program for the convention in October. From the list of big names scheduled to speak we are beginning to believe that this year, 1938, "is gonna be different"—and GOOD. We urge you to be in Chicago at the Stevens on October 18, 19, 20 and 21.

▼

This month we offer another article by B. C. Burden on the most important subject of "Coordination of Telephone and REA Power Lines." Because of its length and many illustrations it will run for several issues. We also call your attention to the Editorial on page 20 about the Wages and Hours Bill.

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 42 No. 8 **August, 1938**

CONTENTS

- Across the Editor's Desk..... 12
- "Tapping In" on Washington By Roland C. Davies..... 15
- Convention Dates..... 16
- Coordination of Telephone and R. E. A. Power Lines, By B. C. Burden..... 17
- New Magnetic Telephone By G. E. Atkins..... 19
- Editorial-Wages and Hours Bill..... 20
- Convention Reports..... 21
- Monthly Station Barometer..... 24
- Motor To Mexico By P. Kerr Higgins..... 25
- Line and Desk—By Ray Blain, A.I.E.E..... 27
- New Automatic Switchboard for Logansport..... 30
- Long Lines—By R. A. Clark Jr..... 32
- Rambler Rambles Again By J. A. Smith..... 34
- Local Test Desk Operation By C. F. Curtiss..... 36

Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 185 N. Wabash, Chicago, Illinois. Phone Franklin 4094. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice- President and Editor; L. M. BERRY, Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $2.00; In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents.

Thank you Mr. J. I. Kennedy. Your invitation to romp and play at the Annual Picnic of the Northwestern Telephone Company at Freeport, Ill., on August 27 is something we treasure. Although we did not get there last year we hope to this time. We still hear about the 1937 party and are herewith reserving a drumstick.

▼

Officials of the National Association really flash a wonderful smile when they discuss the program for the convention in October. From the list of big names scheduled to speak we are beginning to believe that this year, 1938, "is gonna be different"—and GOOD. We urge you to be in Chicago at the Stevens on October 18, 19, 20 and 21.

▼

This month we offer another article by B. C. Burden on the most important subject of "Coordination of Telephone and REA Power Lines." Because of its length and many illustrations it will run for several issues. We also call your attention to the Editorial on page 20 about the Wages and Hours Bill.

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol. 42 No. 8 **August, 1938**

CONTENTS

- Across the Editor's Desk..... 12
- "Tapping In" on Washington By Roland C. Davies..... 15
- Convention Dates..... 16
- Coordination of Telephone and R. E. A. Power Lines, By B. C. Burden..... 17
- New Magnetic Telephone By G. E. Atkins..... 19
- Editorial-Wages and Hours Bill..... 20
- Convention Reports..... 21
- Monthly Station Barometer..... 24
- Motor To Mexico By P. Kerr Higgins..... 25
- Line and Desk—By Ray Blain, A.I.E.E..... 27
- New Automatic Switchboard for Logansport..... 30
- Long Lines—By R. A. Clark Jr..... 32
- Rambler Rambles Again By J. A. Smith..... 34
- Local Test Desk Operation By C. F. Curtiss..... 36

Published Monthly by

Telephone Engineer Publishing Company

A Magazine devoted to the interests of the entire telephone industry—operating men and manufacturers.

SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 185 N. Wabash, Chicago, Illinois. Phone Franklin 4094. J. A. SMITH, President and Treasurer; RAY W. SMITH, Vice- President and Editor; L. M. BERRY, Vice-President; D. WEINER, Secretary Subscriptions: U. S., Cuba, Mexico, $1.00 Per Year; Canada, $2.00; In all Other Countries, $3.00. Single Copies, U. S. A., 15 cents.

TELEPHONE ENGINEER
MANAGEMENT · ENGINEERING · MAINTENANCE

AUGUST, 1938

"Tapping In" On Washington

By ROLAND C. DAVIES
Editor
Telecommunications Reports

THE initial steps in the launching of the new Wages and Hours Act and Administration with the induction into office of the new Administrator, Elmer F. Andrews, New York Industrial Commissioner, will undoubtedly hold the spotlight of attention for the telephone industry during August, even though the statue does not become effective until October 24th.

The full impact of the new Act in its minimum wages and work week upon the telephone industry, both in the case of the Bell System and of the Independent Companies, has been the subject of intensive study by the executives and attorneys of the industry. Although in its interstate applications, if only toll operators would fall under its provisions, the increased wage burden on the telephone companies would not bulk very large, *it appears to be the program of the Federal authorities to implant the same standards of wages and hours of work upon intrastate commerce which would mean a very heavy rise in wage costs in case of telephone companies, especially those serving rural districts and communities.*

The inauguration of this plan for similar state wage-hour laws loomed in the summoning to a conference with Secretary of Labor Perkins of the state labor commissioners of six states—New York, Connecticut, North Carolina, Oklahoma, Illinois and Utah. These states might be considered a cross-section of the nation and in nearly each instance the state administrations are favorable to the aims of the New Deal. As yet no date has been designated for this conference, but it is assumed that it is to be staged in mid-August after the new Administrator Andrew takes his post.

THE telephone industry, in some interpretations of the new Wages-Hours statute, may be largely exempted from the provisions of the Federal Act through the phrase in Section 13 (a) (2) that **"employees in retail and service establishments, the greater part of whose business is within the states."** Servicing has been viewed as having application to the telephone industry. However, until the new Administrator takes over his office and the unit to administer the law is established with a legal department, the interpretation of this phrase is still in the realm of speculation.

● The formation of a telephone industry committee to recommend reasonable classification of wages and hours on the basis of living costs and collective bargaining arrangements will be the major phase of the study of the effect of the Wages and Hours Act after the new Administration starts functioning. Undoubtedly the greatest argument for the telephone industry is that its wages and hours are generally the best in the communities served and, of paramount significance, that telephone earnings out of which wages must come are made static through the close regulation of rates by state commissions.

The launching of the consideration of the new Wages-Hours Act, therefore, definitely appears to be the most important subject in the National Capital during August and the early fall.

FCC In Vacation Lull

AFTER a rather busy month of hearings on broadcasting and radio matters during July, the FCC quieted down in August for a vacation lull with most of the Commissioners absent from Washington during a part of the month at least. FCC Chairman Frank R. McNinch returned to his post in early August after spending several weeks in the hospital for treatment of colitis and turned his efforts mainly towards the planning of the broadcasting chain monopoly investigation to be conducted by the Commission during the fall. There were during the latter part of July and early August practically no actions on telephone matters other than the opproval of acquisition by the Indiana Bell Telephone Co. of the small Dugger, Ind., Mutual Telephone Co. and the decision that the North-West and Milton-Milton Junction Telephone Companies were under the full FCC jurisdiction because of the control of the Wisconsin Telephone Co.

One interesting development in early August was the step to bring into the regular organization of the Commission staff a small group of the former Telephone Investigation staff workers, including Chief Engineer Cyrus G. Hill, to continue the work of the former Rate and Research department. The new rate and research unit will be on a temporary basis, provided the plan is approved and a deficiency appropriation is sanctioned, but might possibly develop later into a permanent branch of the commission. During the summer so far there has been very little work by

the Commission staff in the formulation of the Final Telephone Investigation report, but it is expected that efforts will be concentrated on that task during the fall.

Future New Deal Aims In Regulation

IN an address before the American Bar Association which was believed to give a rather authoritative picture of the aims of utility regulation by the New Deal Administration, Special Assistant to the Attorney General Robert M. Cooper declared that unless the antagonisms and conflicting interests between private utility management and regulatory commissions can be eliminated and if the tendency of courts to implant upon regulatory agencies procedural limitations continues to grow the present tendency towards public ownership is certain to receive greater impetus. Mr. Cooper, who is considered the Justice Department's specialist in utility regulation, declared that utility regulation was on trial as never before and private utility management is in a crucial position to make regulation effective.

● The Justice Department spokesman declared that private management should not make the profit motive so dominant, should develop a spirit of co-operation with the regulatory bodies and should hold "an enduring sense of public trusteeship." *In regard to the expansion of regulatory agencies into supervising management policies and actions of utilities, Mr. Cooper made a most significant analysis which is contrary to views of some regulatory authorities. He felt that too stringent administrative control over management would stifle progress and good service and that "when administrative control supplants managerial initiative and responsibility, regulatory standards which were intended to be minimal merely in character and quality tend to become the accepted criteria of service." He stated that regulatory control is not a practical substitute for the inititive and efficiency of enlightened management.*

Mr. Cooper listed a number of so-called deficiencies in administrative regulation which comprised "the atmosphere of antagonism," "judicial control," "the rate making problem," "jurisdictional limitations" and "division of responsibility." Mr. Cooper declared that regulatory commissions may become "too judicially minded" and declared that this danger was enhanced with each attempt of the courts to impose its methods and procedure upon the regulatory agency. But "so long as private utility management conducts its operations in clear recognition of the fact that it is in effect carrying on a public function which government would be compelled to perform if private enterprise were unavailable, the threat of public ownership will remain largely theorectical," he said. Public utility regulation was characterized as the outstanding development in American governmental processes during the past half century by Mr. Cooper who appeared to place the federal agencies on the pedestal of greater achievement than the state commissions.

● The antagonisms between utility management and commissions were attributed as the outstanding defect in the Americas system of regulation by Mr. Cooper who said that private management is seldom found in a co-operative spirit and the "interference" with management by commissions is looked upon as a necessary evil. The process of regulation has come to resemble "more a half-hearted compromise than an instrument of control," Mr. Cooper continued. "Both sides are able to point to occasional victories but neither is particularly satisfied with the long term results. If the profit motive continues to dominate the desires of public utility management and there is every reason to believe that it will—antagonism and animosity are likely to grow until the entire scheme of regulation breaks down under the destructive force of the struggle which is certain to ensue."

THAT the present constitutional limitations of the division of powers between the Federal and state government constitute another potent defect in the process of regulation of utilities was also cited by Mr. Cooper. He viewed a solution of this problem was possible through cooperation by the Federal and state agencies in regulation but stated that, while these results were encouraging, this method was still on trial. Mr. Cooper indicated that utility operations in many instances were beyond local regulation and were better handled by the Federal authorities.

The Justice Department spokesman proposed three alternative methods of control in case regulation fails—the co-operative system such as in Sweden, government competition and public ownership. The cooperative method he said meant production for use rather than profit and a substantial equality of ownership by the consumers, was increasing in the utility field. He mentioned the cooperative telephone companies (mutual farmer lines) and added that the possibility of the cooperative as a solvent for the public utility problem in America was largely unexplored in America.

● The process of rate making was termed another deficiency of regulation by Mr. Cooper. Court restrictions and the opportunities for delay in litigation over rate cases through the intricate valuation and reproduction cost judical decisions were cited by Mr. Cooper. Another judicial restriction was contained in the limitations placed over regulatory supervision of operating expenses. Mr. Cooper noted the Supreme Court ruling that regulatory agencies cannot substitute their discretion on operating expenses unless there was an abuse of discretion by corporate officers and termed this ruling so vague as to prevent the regulation of this element.

This factor of operating expenses is highly important in the case of operating companies owned by a holding company which provides them with services and equipment "at an arbitrary price established by officials of the parent organization," he stated.

● Remedies of the rate-making problem included one possible method of permitting tentative rates to be established by a commission during the course of a rate proceeding. While this method has advantages, he added there was a tendency to overestimate its general effectiveness. The so-called Washington sliding scale of return plan was also mentioned and was criticized because it had the difficulty of initial valuations. No single method has yet shown up as a panacea, he added.

COMING CONVENTIONS

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 21, 22 and 23.

South Dakota Telephone Association, Mitchell, October 5 and 6.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 18, 19, 20 and 21.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, Thursday, October 20.

Virginia Independent Telephone Association, Hotel John Marshall, Richmond, November 3 and 4.

Tennessee Independent Telephone Association, Hermitage Hotel, Nashville, November 14-15.

Alabama Independent Telephone Association, Jefferson Davis Hotel, Montgomery, November 28 and 29.

Coordination of Telephone and R.E.A. Power Lines

By B. C. BURDEN

Transmission Engineer—Lincoln Tel. & Tel. Co.

Due to the thousands of miles of rural power lines being built with R.E.A. funds throughout the country, telephone men everywhere are faced with the problem of coordinating their telephone lines with the newly constructed rural power lines in an effort to minimize inductive interference. The inductive problem is and will be aggravated by the extensive character of the R.E.A. power networks as well as the lack of familiarity with inductive problems, on the part of those responsible for the maintenance and operation of the completed power systems. For a number of years, private power companies have recognized that inductive interference is a mutual problem of telephone and power companies, and have schooled themselves in the inductive coordination of power and telephone systems, and the application of remedial measures where required.

General

THE splendid cooperative effort exhibited by most private power companies has enabled telephone companies to furnish reasonably good service to rural subscribers even though heavily paralleled by power distribution systems. Independent telephone men throughout the country should endeavor at all times to interest those responsible for the maintenance of *R.E.A.* rural lines in the sound thought that the inductive problem is a mutual one and can only be solved satisfactorily when power and telephone companies cooperate fully with each other.

The several kinds or classes of telephone companies involved with *R.E.A.* lines are affected differently. The larger operating companies generally have an adequate technical staff and funds with which to change or modify existing telephone lines so they can continue to serve in the presence of the *R.E.A.* power lines. However, many of the smaller Independent Telephone companies, particularly the so called *mutuals* are severly handicapped in that neither technical assistance nor funds with which to modify existing telephone plants so that they can render service even though heavily paralleled.

It is not the purpose of this article to discuss the effect of *R.E.A.* type lines on the economic welfare of the small Independents, but to cover from a non-technical standpoint the general nature of the inductive interference problem and to review the various practical remedial measures.

Various Types of Power Lines

There are several types of power lines suitable for rural power distribution service. These are commonly referred to as:

(1) the delta system,
(2) the unigrounded Y system,
(3) the multigrounded Y system,
(4) the single phase isolated line.

● The effect on paralleled telephone lines of the various types of power systems will depend upon the inductive influence of the particular types of system used as well as other factors such as generating and load apparatus. Under similar conditions with respect to the interfering characteristics of the power generating apparatus and the relative length of the single and three phase portions of the power network, the several systems can be classified approximately as their inductive influence or effect on paralleled telephone lines.

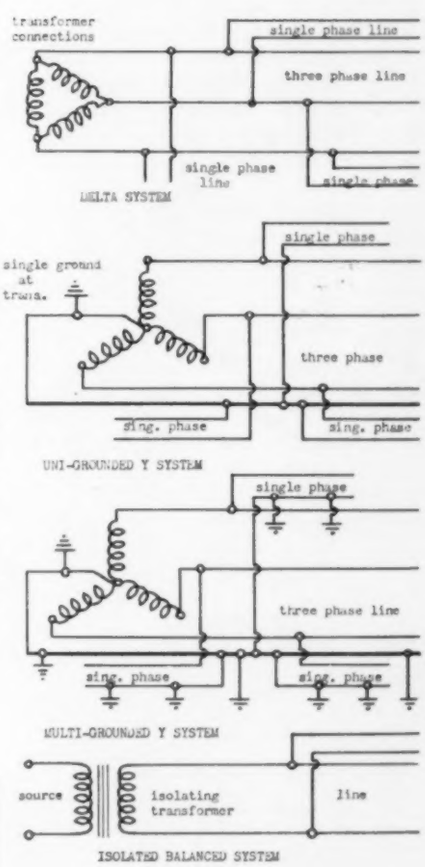


Fig. 1 Schematic of Four Basic Types of Rural Power Systems.

Table No. 1—Relative Inductive Influence of Several Types of Power Systems

Single Phase Isolated	Delta	Multi-grounded Y System
13%	70%	100%

Note: The above comparison is based on the multi-grounded system as offering a maximum inductive influence of 100%

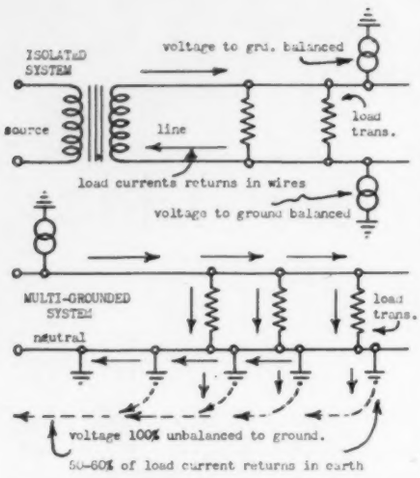


Figure 2. Relative Interfering Effect of a Single Phase Isolated System and a multi-grounded Y System.

It must be kept in mind that the interfering effect of any one of the systems will vary from the values given, however, in general, the results are typical of the relative influence of each system. From the above data it is apparent that the multigrounded Y rural distribution system will offer maximum influence to telephone lines. Also that the single phase isolated type of power system though considerably more costly to install and maintain has an unusually low inductive influence. In other words power companies do have available a type of power line which will offer a low inductive influence to telephone lines. The lines constructed throughout the United States with *R.E.A.* funds are of the multigrounded Y type. This type of power system was undoubtedly selected by *R.E.A.* because of its low first cost and certain operating advantages. Those advocating this type of line call attention to certain inherent safety features it has.

● It can be said with accuracy that the multi-grounded Y rural distribution system is ideal from the power standpoint but presents a maximum inductive interference to telephone lines. Though it is often argued that other types of power systems paralleled particularly the delta

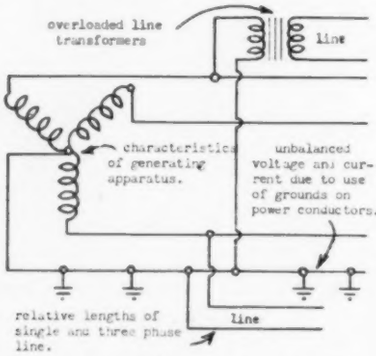

overloaded line transformers
line
characteristics of generating apparatus.
unbalanced voltage and current due to use of grounds on power conductors.
relative lengths of single and three phase line.
line

Figure 3-1. Factors Affecting Inductive Influence of Power Lines.

will under certain circumstances be just as bad or nearly as bad as the multigrounded or ungrounded Y, it is generally agreed, and some competent power engineers have testified under oath that the average delta system has far less inductive influence than almost any multigrounded Y system. Fig. 1 shows schematically the arrangement of the several types of power systems.

Multi-grounded Line Here To Stay

Inasmuch as the multigrounded Y type of line seems to be firmly entrenched as a standard type of rural distribution system that the power folks are now and will in the future construct, there is little value in telephone folks arguing as to the relative inductive influence of this system as compared to some other type. We should consider that it is the principal system with which we will deal in the future and we must consider ways and means of coordinating our telephone lines with it for minimum noise. The inductive influence of a multigrounded

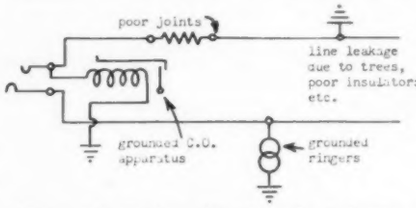


Figure 3-2. Factors Affecting the Inductive Susceptiveness of Telephone Lines.

power line is higher than that on a delta system or an isolated system primarily for the reason that the single phase taps, on the multi-grounded line are from a voltage standpoint 100% grounded and from a current standpoint from 50 to 60% grounded. Any telephone man knows that the inductive influence of a power line is much greater where power currents flow in the ground, or where power voltages are connected to ground, as compared to currents or voltages that confine their path to the metallic power wires. It of course, must be realized that even in the delta system that under some conditions currents flow in the earth and unbalanced voltages exist to earth but it is only in exceptional cases that inductive conditions are as bad as in the multi-grounded case. Fig. 2 illustrates this point.

Types of Telephone Circuits Affected

IN our inductive problems, we should consider both the *inductive influence* of the power system and the *inductive susceptiveness* of the telephone system. Our remedial measures may involve merely changes in the power system which lowers its inductive influence or changes in the telephone system which lowers its inductive susceptivenes or a combination of changes in both systems to bring about a satisfactory noise level on the telephone system. Factors affecting the inductive susceptiveness and influence of power and telephone lines are shown in Fig 3. Let us consider the various factors that affect the inductive susceptiveness of telephone lines. It will simplify our discussion if we separate our telephone lines into three groups or classes, viz:

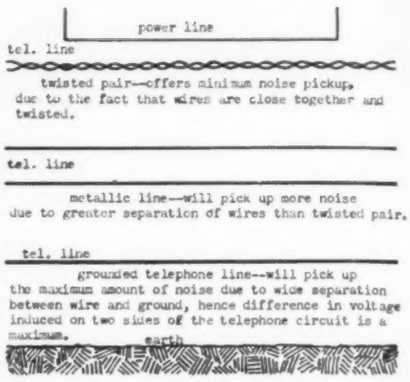

power line
tel. line
twisted pair--offers minimum noise pickup, due to the fact that wires are close together and twisted.
tel. line
metallic line--will pick up more noise due to greater separation of wires than twisted pair.
tel. line
grounded telephone line--will pick up the maximum amount of noise due to wide separation between wire and ground, hence difference in voltage induced on two sides of the telephone circuit is a maximum.
earth

Figure 4. Wire Spacing and Effect on Noise.

(1) grounded telephone lines, that is, lines operating with a single wire and using the earth as a return conductor,

(2) open wire metallic lines, and

(3) city and short rural cable lines.

The grounded telephone line makes use of a single line wire and utilizes the earth as a return conductor. It is the most susceptive type of telephone line to inductive interference due to the fact that the two sides of the circuit are widely separated compared to the condition where the two sides are closely adjacent to each other. Contrary to statements that have been made in some recent commission hearings and in certain court testimony, the noise created on grounded telephone lines does not result from the power getting onto the telephone lines via subscribers station grounds or by accidental tree contact, but rather through direct *inductive coupling* between power and telephone wires which as stated is aggravated due to the separation between the two sides of the telephone circuit. If the two sides of the telephone circuit were close together the

(Please turn to page 34)

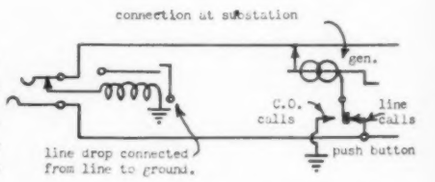


Figure 5. Push Button Signaling Rural Lines.

New Magnetic Telephone

By G. E. ATKINS
Apparatus Development
BELL LABORATORIES

TELEPHONES which had no source of energy other than the speaker's voice were the earliest commercial instruments. A diaphragm of soft iron served both as a collector of sound energy and as a means of varying the flux through a coil. Voice currents generated in this instrument were far less powerful than those given by the carbon-granule transmitter, which soon came to dominate the field. A magnetic transmitter, however, is simple, portable, and independent of current-supply, and it would be attractive for use in construction camps, warehouses and ships. Better knowledge of magnetic materials and structures has suggested that its output could be greatly increased by proper design.

In the magnetic telephone which is the outcome of recent development work in these Laboratories, a cone-shaped duralumin diaphragm is connected to one end of an armature which lies between the poles of a U-shaped permanent magnet. When sound waves strike the diaphragm the armature vibrates and varies the air-gaps between it and the pole-pieces of the magnet. This changes the reluctance of the magnetic circuit and induces voice-frequency currents in a coil which surrounds the armature but does not touch it. Conversely, when voice currents are imposed on the coil, the armature and diaphragm vibrate and reproduce speech. Thus, a single instrument serves alternately as transmitter and receiver.

Signalling current is generated at either end of the line by varying the reluctance of the magnetic circuit of the telephone instrument rapidly enough to create an audio-frequency current. Near the ends of the armature are two discs with teeth of magnetic material; both discs are attached to the same spindle and mounted at the side of the magnet as shown in Figure 1. Their action is illustrated in Figure 3 where the parts are shown in their correct positions except that the two rotors have each been turned ninety degrees for clearness of illustration. The total gap from either pole-piece to the armature by way of the rotor tooth is substantially less than the distance between the pole-piece and the armature. Also, the rotors are displaced angularly so that the left rotor is in position to shunt the air gap between the north pole and armature when the right rotor shunts the gap between the south pole and armature, and vice versa. This makes the flux pass from the left end of the north pole-piece to the tooth of the left-hand rotor, thence, through the armature to the tooth of the other rotor, and to the right end of the south pole-piece. Similarly, when the rotors have progressed a little farther the flux goes from the right-hand north pole to the left-hand south pole through the armature. In this manner the flux through the armature is reversed periodically and an alternating current is induced in the coil. The rotors are driven from a hand crank through a gear train so that the frequency of the current is in the order of 1,000 cycles per second. This frequency lies not only within the peak of the response curve of the instrument but at a value where the human ear is relatively sensitive. The acoustic level of the signal is very much higher than that of the standard telephone ringer.

To obtain an efficient magnetic circuit with small lightweight parts, the magnet in the telephone structure was made of remalloy, a highly remanent material. Pole-pieces, armature and teeth of the rotors are made of permalloy; the teeth themselves are separated by non-magnetic material in order to reduce leakage.

A five-foot cord, the two conductors of which terminate in clips of conventional design, is provided to attach the telephone to a permanent or a temporary line. A small leather carrying case with a shoulder strap is also available. The instrument itself is about three inches square and weighs less than two pounds.

A wall-type telephone embodies a transmitter which functions as a signal generator and reproducer, and a receiver which

(Please turn to page 35)

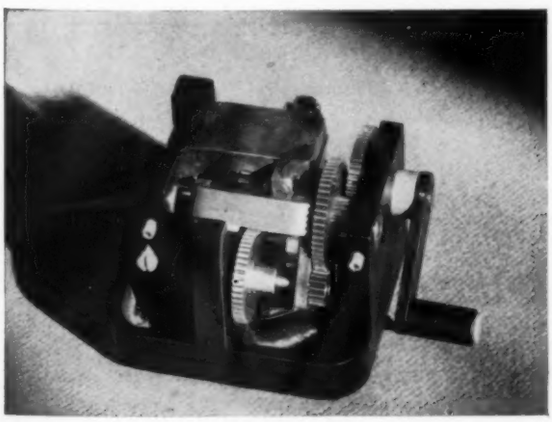


Fig. 1 — The new magnetic telephones have a powerful permanent magnet. The diaphragm itself emits a siren-like tone to signal the person called.

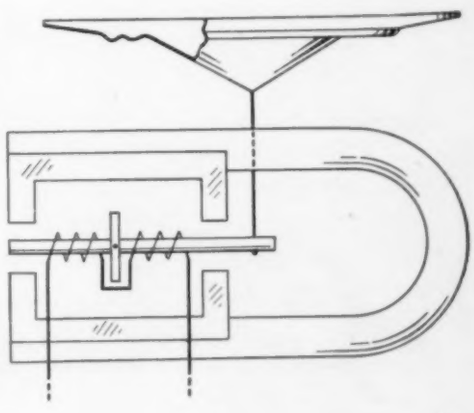


Fig. 2 — The diaphragm is attached to a rocking armature similar to those used in certain types of loudspeakers.

Editorial

Effect of the Wage and Hour Act

The prediction, that if the Federal Wage and Hour Bill, entitled "Fair Labor Standards Act of 1938" applies to the Independent telephone industry, approximately 6,000 telephone exchanges ultimately will be put out of business, has caused quite a stir in the industry.

The Wage and Hour Bill, enacted into law June 25th and effective October 25th, provides that for the first year after the latter date all employees shall be paid a minimum of 25 cents per hour; during the next six years the minimum wage shall be 30 cents per hour and after the seven years the minimum wage shall be 40 cents per hour. As to maximum hours the law provides that for the first year after October 25th employees shall not work more than 44 hours per week; during the second year not more than 42 hours per week and after the two years not more than 40 hours per week.

There has been considerable speculation as to whether the Act applies to Independent telephone companies because of a clause in Section 13 which states the Act shall not apply to "any employee engaged in any retail or service establishment the greater part of whose selling or servicing is in intrastate commerce." It would seem that there is reason to believe that Independent companies would be exempt inasmuch as they should be defined as service organizations, as they certainly are, and the greater part of the business of most companies is intrastate.

However, while no legal opinion has publicly been given regarding this possible exemption, it is believed that prominent attorneys of the industry will be of the opinion that Independent telephone companies are in fact service establishments and are therefore exempt from the Act if their business is less than 50% interstate. However, every company should make an analysis of the effect the Act might have on its payroll and be prepared to defend itself against any unreasonable and prohibitive increase in its expenses which compliance with the Act might bring about.

In order to point out the possible dangers in this Act, we have made studies of present payrolls of several Independent telephone companies compared with what they will be with the proposed changes to ascertain what may happen to many companies as a result of this Act. In the following table we are giving results of these studies for eight companies which we designate as A, B, C, etc.* The amount and percentage of increase of each upward step in minimum wages and decrease in maximum hours, and the 1937 net income of the companies are given in order to show just what effect this increase in labor expense will have on the earnings of the companies. It readily can be seen that compliance with the Federal Wage and Hour Law will definitely jeopardize the financial stability of the companies listed.

(Please turn to page 41)

*

Company	Increase over Present Annual Payroll of 25c Per Hour and 44 Hours Per Week		Increase over Present Annual Payroll of 30c Per Hour and 42 Hours Per Week		Increase over Present Annual Payroll of 40c Per Hour and 40 Hours Per Week		1937 Net Income
	Amount	Percent	Amount	Percent	Amount	Percent	
A (220 Stations)	$ 2,178.00	125%	$ 2,761.60	159%	$ 3,628.68	209%	$ 775.00
B (12500 Stations)	39,741.14	40%	55,437.14	55%	89,337.50	89%	49,000.00
C (300 Stations)	1,259.28	53%	1,696.08	78%	2,569.68	119%	985.00
D (2400 Stations)	13,457.04	49%	18,747.84	69%	28,358.16	103%	13,000.00
E (14900 Stations)	68,440.68	50%	91,789.80	69%	148,004.64	107%	96,000.00
F (3100 Sttaions)	25,032.36	66%	34,514.16	91%	52,432.16	141%	18,000.00
G (3300 Stations)	17,234.40	90%	22,853.76	119%	34,155.36	178%	22,000.00
H (900 Stations)	10,727.76	116%	13,899.60	140%	20,255.52	219%	860.00

C. F. Mason Again Leads California Independents

CONCLUDING with a discussion on the revision and amplification of rules and regulations under which telephone companies are operated, and proposed radical changes in them for the establishment of credit, the 1938 convention of the California Independent Telephone Association ended a two day session on July 7th at the Miramar Hotel in Santa Monica.

Re-elected were: president, C. F. Mason, president of the Associated Telephone, Ltd; first vice president, William De Carteret, president Exeter Telephone Company; second vice president, Orin Gallup, manager Whittier Home Telephone Company; Treasurer, James S. Campbell, auditor of the Downey Home Telephone Company and Ernest Irwin as Secretary.

The directorate was held intact for another year. These include in addition to the officers D. A. Sattler, general manager of the Santa Barbara Telephone Company; O. A. Prest, manager of the telephone division of the California Water & Telephone Company, Monrovia; and H. F. Knapp, owner of the Sanger Telephone Company.

Held in a very beautiful section of California with excellent weather, the attendance was much larger than usual with a number of visitors from the East in attendance.

Addresses were made by C. J. Mason, Ernest Irwin, Louis Pitcher, of the United States Independent Telephone Association, C. D. Warner, engineer for the Interstate Telegraph Company and affiliates; J. E. Cooper; A. P. Hill, engineer for the Southern California Telephone Company; Assistant General Agent Moe, of the Associated Telephone Company, Ltd; F. J. Fleming and Eliot H. Cheadle, vice president of the Associated Company.

Oregon Association Elects New Officers

THE Oregon Independent Telephone Association held its annual convention at the Portland Hotel, Monday, June 27th. It unanimously elected Chas. E. Wells, owner of the Northwest Telephone Company, as its new president. Leslie A. Gritten, District Manager of the West Coast Telephone Company, was elected secretary. In addition, Geo. E. Muhle of the Oregon Washington Telephone Company, C. H. Miller of the Mt. Hood Telephone Company, and Lowell E. Brown of the Interurban Telephone Company were elected to the board of directors.

E. R. Hannibal, president of the Washington Independent Telephone Association and general manager of the West Coast Telephone Company was a guest of honor.

The convention enjoyed a full program with President C. H. Miller of Dufur in the chair, C. E. Wells acting as secretary. The Honorable Joe Carson, Mayor of Portland, made a vigorous speech of welcome. Louis Pitcher, Executive Vice President of the United State Independent Telephone Association, made an outstanding talk on national affairs. E. C. Russell, Auditor of the Public Service Commission of Oregon, spoke on accounting procedure. W. A. Cook, P. U. C. Telephone Engineer, discussed the preparation and submittal of telephone rate schedules. R. C. Hummel, of the West Coast Telephone Company, discussed switchboard maintenance. John H. Carkin, Oregon State Tax Commissioner, spoke on taxation, Joseph Wimmer, of the Pacific Telephone and Telegraph Company, outlined recent advances in transmission. A fitting tribute was paid to the late Geo. A. Bauman who acted for many years as secretary of the Association prior to his death in an accident last January.

Michigan Meeting

THE Michigan Independent Telephone Association held its annual convention at the Hotel Old, Lansing, on July 27, and 28. The attendance was much larger than for the two previous years. Serious discussion of the employment of a full time secretary was discussed during the meeting.

Resolutions passed by the Association include one of protest to the proposed FCC uniform system of accounts for Class B companies, in which claims were made that it was imposing an unnecessary, complicated, burdensome, and expensive system of accounts on small companies. Another resolution approved

(Please turn to page 34)

ATTENTION!

ALL TELEPHONE PEOPLE

You are Invited to attend

the 34th Annual State Convention

of

THE ILLINOIS TELEPHONE ASSOCIATION

to be held at

Hotel Pere Marquette, Peoria, Ill.

September 21 to 23 inc.

INTERESTING PROGRAM FOR TELEPHONE MEN

OPERATORS' CONFERENCE

MANUFACTURERS' EXHIBITS

Banquet, Dance

and

Entertainment for All

MAKE YOUR HOTEL RESERVATIONS NOW!

STROWGER AUTOMATIC

IN 1907

In 1907, seven years before the outbreak of the World War, the officials of the Richmond Home Telephone Company of Richmond, Indiana, adopted and installed 1600 lines of Strowger Automatic equipment for their exchange.

This was during the presidential term of Theodore Roosevelt—automobiles, then a distinct novelty, had to be cranked by hand and carried acetylene headlights for night driving. Radio was a dream in someone's mind, while "talkies," electric refrigerators, air mail and streamlined trains were completely unheard of. . . . Yet, even then, many telephone men had been converted to the idea of automatic telephony, and with the courage of their convictions, had installed Strowger Automatic equipment in their exchanges!

AUTOMATIC

MAKERS OF TELEPHONE, SIG... COMMUNICATI...
ELECTRICAL ENGINE... AND CONSU...
Distribut... Possessions
AMERICAN AUTOMATIC ELECTRIC SA... 1033 W. Van Bu...
Export Distributors: AUTOM... SALES COMPA...

STROWGER AGAIN

IN 1938

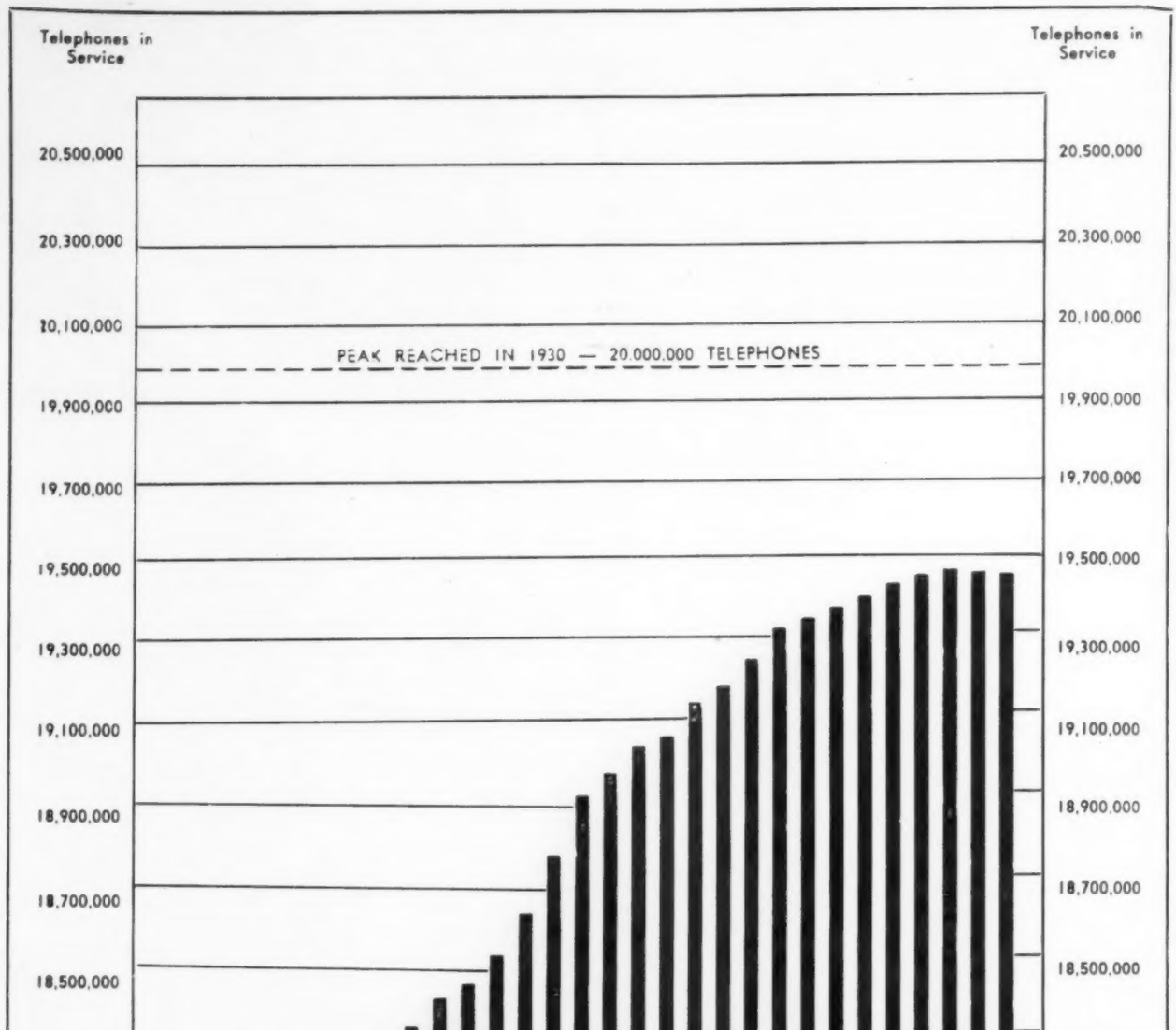
In 1938, thirty-one years after the first installation, the original equipment was still performing satisfactorily alongside later additions of similar equipment — a remarkable record of flexibility in meeting changing needs. However, the directors of the Richmond Home Telephone Company felt the time had come for its replacement, and met to consider new equipment. After careful study, they found that what had been their personal belief in 1907 had become world-wide conviction in 1938! Not only in this country, but in almost every foreign nation as well, the Strowger Automatic system had become the recognized standard of modern times.

Needless to say, the directors again chose Strowger Automatic for Richmond, and Automatic Electric is now building 4700 lines of new equipment to replace the old. Telephone administrations who wish to guide their future by the known lessons of the past can select Strowger Automatic equipment with the sure knowledge that it is now, as then, the finest as well as the most economical equipment that it is possible to buy.

AUTOMATIC ELECTRIC

COMMUNICATION APPARATUS
AND CONSULTANTS
Possessions
1033 W. Van Buren Street, Chicago, U.S.A.
SALES COMPANY, LIMITED

Monthly Telephone Station Barometer



Vacation Hint—

Motor to Mexico

Concluding P. Kerr Higgins' report on Mexico and its tourist features. This chapter includes his opinions on Political, Religious and the Telephone Situation. Also the experiences of a pioneer Telephone Man at his first "Bull Fight."

A common sight is the peon going to market. This one was on the highway too encumbered to use his thumb.

Communism and Fascism

EVERYWHERE one can see bills posted on buildings announcing meetings of these "isms." If they united, they would control Mexico. Mexico is in reality an Indian country with a veneer of civilization and so the communual spirit existed before it was dreamed of by the Russians. The Aztec remains prove this to be true. Reduced to modern terms, it means that one can own the surface of land, but what is underneath belongs to the State. This in a large measure explains the recent expropriation of the oil industry. Mexicans in general claim they are Socialistic.

Don't Miss The "Floating Gardens"

SUNDAY is the big day in Mexico City. We spent the morning at Xochimilco (ten miles from the City) among the flower bedecked barges (60c per hour) floating on the miles and miles of canals, with the odor of the flowers and the sweet music of the "Gondoliers,"—then lunch at the Pavilion. Truly this is the mecca of all tourists. These canals are the source of Mexico City water supply. We then went out the famous Avenue De La Reforma, festooned by bougainvilleas and geraniums. Enroute we saw the rural police, vaqueros and charros (cow-boys in costume and gentlemen riders) with their beautiful uniforms, scarlet blankets and fine horses. This also is the opportunity to visit the roof garden of the Hotel Reforma, where beautiful views of the city may be had. At the end of the Avenue, is the famous Chapultepec Park, one of the finest on this Continent, with its castle (White House) on a high hill overlooking this beautiful park. This was formerly the quarters of Cortez; then it was the Venice of Mexico, before the Lakes were drained. Quiet paths run in every direction and good auto roads. Here is the "Quixote Fountain" and benches in beautiful tile from the artists at Puebla, telling the story of Don Quixote. There is also a splendid Zoo in this Park.

● From the Castle excellent vistas are to be seen in every direction and the two famous sentinels, Popocatepetl (old Popo), the "Mountain which Smokes," and Ixtaccihuatl (Ixy), the "Sleeping Lady in White," a visit to these two mountains calls for a two-day side trip.

And now the **"Big Event."**

The Bull Fight

SUNDAYS and holidays find an enthusiastic audience of 25,000 in a fine concrete amphitheatre attending their favorite spectacle. What baseball is to Americans the Bull Fight is to Mexicans, only more so, as to them it is a Pagan Rite. "Pany Toros" is "Bread and Bulls" and means more to them than anything else. Each Toreador has his admirers and much rivalry exists which lends spice to the show. They use score cards and keep close tab on every feature. Only the experts can note the fine points (as in baseball) and yet it is most interesting. The game is much more refined than in years gone by. The rules and rites are kept unchanged, because it is considered one of the fine arts and a pagan ceremony.

The opening is an Auto Parade of the "Queens." They are beautifully dressed in Spanish costumes and later occupy a special box for the performance. Immediately following the show begins. First of all there was a most marvelous display of horsemanship by Simao Da Veiga, a Portaguese and his wife. After this, the first bull was let into the ring and for the first time, we saw bulls fought by this expert on horseback, something new and to my mind much more fascinating than when done on foot. The final act was done without reins and brought the audience to their feet as one man. Eight bulls in all were killed. Hats, coats, etc., were thrown in the ring when the Matadores (two of Mexico's finest—Armillita and Garza) did some especially fine sidestepping on their knees, using a handkerchief instead of the red scarf or holding themselves at arm's length from the bull by pressing a hand against it's forehead.

We were told the bulls were kept in total darkness for a week prior to the performance and given little food, and they certainly look fierce when turned loose into the ring. This performance lasted about three hours. After it was over, the bulls for the next week's show

Old Convent Acolman. Mexico is rich in Religious History with Numerous Convents and Missions.

A Birdeye View of the New Highway at Mamulique Pass.

were brought into the ring in huge boxes on wheels. They were let out of these boxes one at a time and led from the Arena by trained steers; otherwise they could not be handled.

Puebla and Cholula (the Holy City of Mexico)

THESE Cities are approximately eighty-five miles from Mexico City and are very interesting.

Puebla is a city of 150,000 inhabitants, 65 churches (all beautiful), and is a comparatively new city built by the Spaniards. The architecture is Andalusian.

The cathedral of Puebla is one of the most interesting on this continent, with its intricate, beautifully carved stonework. The Library has 25,000 manuscript books, a clock one hundred and twenty-five years old and still going. There is also in Puebla a very interesting old convent, with secret passages connected with the nearby church. This is now used by the Government as a museum, and requires two hours to visit.

Enroute to Puebla, we stopped at Cholula, "The Holy City" of Mexico, with its more than 165 churches, one of which is on top of the pyramid overlooking the city; also one with twenty domes. One of the big mistakes of our trip was not seeing more of Puebla and Cholula; better luck next time.

Mexico City is very modern in practically all respects, but this has not destroyed its good breeding. You can't miss noticing it. It is a National trait. The slogan is "Soak the Rich" so if one insists on luxury or imported goods, he must pay the price, but their dollar goes much farther than ours,—that is especially on Mexican made goods.

There are no "Tin Lizzies" in Mexico; either they have a good modern car or none at all. Mexicans love to carry fire-arms and do.

● Tourists must be on the lookout for pick-pockets in crowded places and should leave pocket-books and valuables in the safety-box at their hotels taking with them only sufficient for the day's expenses. The Mexican "Ladron" is very clever and quick at this game. Any annoyance should be reported to the Police.

Like all tropical countries they have a siesta from one o'clock in the afternoon to three-thirty, when business rests and nearly all stores are closed. Traffic falls off abruptly and hence is a good time for the tourist to become acquainted with the City proper without inconvenience.

So far Mexico has not been commercialized like Europe and so entrance fees are very small—from 5c to 12c per person. Taxies average 50c per hour or per trip as agreed upon.

It seems to us that the tourist who complains against Mexico either has not traveled much, expects too much or is terribly prejudiced and if so, why they insist on travelling is a mystery. Usually such people would not be happy anywhere. They usually insist on calling Mexicans "Foreigners," while in reality we are foreigners. In Mexico and its people we can see our own shadow.

Religion In Mexico

I WAS interested in the religious situation and was told reliably that the Catholic Church had severed its connection (practically) with Rome and that no money was being sent to the Church at Rome from Mexico. Only one priest is allowed to each parish. The order of Monks has been abolished. Nuns are allowed in the hospitals and schools, but on the streets, priests and nuns are not allowed to wear their robes. The church cannot own property. These are the only changes made and apply in a similar manner to other religious orders. In this matter and in politics the slogan is "Mexico for the Mexicans." Many of the churches have been turned into museums and others have been closed. In politics, and in religion Mexico is badly divided between left and right. There are now three distinct factions with very little in common. The one who controls the Army will be successful at least for the time being.

Generally speaking, the present administration is in bad with the majority and the late Government policies have been enacted to "Save Face." Mexicans take things much more seriously than we do, are more excitable and violent and this develops Revolution instead of evolution.

To those interested in the past, the unearthed City of the Aztec, pyramids, Teohihuacan, Acolman Convent and Milta are very interesting.

"Manana" may be the slogan in the country, but not in Mexico City. It is a particularly noisy City and except during the "siesta" everybody seems to be on their toes and the taxies are more of a nuisance than in the U.S.A. Auto "tooting" is terrible.

We took twelve hundred feet of movie film and found no trouble in taking pictures anywhere, even in the Bull Ring.

The school system in Mexico is very greatly improved. English is compulsory in secondary schools.

Mexico is today dreaming and working for a civilization far beyond anything we have. (Will they reach it?) Namely a radical democracy along very broad lines.

Telephone Service

TELEPHONE service in Mexico is being given by two competing companies, neither one having much over the other. Result,—two telephones in most business houses and much dissatisfaction among the patrons.

Service is neither good or efficient as a result of the cloud which has hung over it for years,—namely Government Ownership. The impression this writer received was that this was not very far off and this probably accounts for so much antiquated equipment in the country and lack of co-ordination.

● Present conditions are very unsatisfactory. In the rural districts iron poles and cross-arms are in common use, but late construction (a small proportion) had treated pine. Long distance shows poor development and there is certainly lots of room for improvement.

The trip was so enjoyable, interesting and economical that we plan to go back as soon as possible.

LINE and DESK

RAY BLAIN, Member A. I. E. E., Editor

Q. When pulling several twisted pair wires into conduit we have considerable difficulty attaching the several pair to the pulling line. How can this best be accomplished?

A. We prefer to use a woven wire grip make like a cable grip, for this purpose. This little grip does a good job, is safe and eliminates the necessity of removing the insulation from the wires to make an ordinary hitch.

Q. We have a large job out in the country where electric current is not available and we desire to use our electric hammer drill. Will you please give us some information as to whether this can be accomplished without excessive cost.

A. On all such jobs we make use of a small gasoline engine unit direct connected to a 1000 watt, single cycle, 110-volt, alternating current generator. This unit is light and portable and we find operates the electric hammer drill entirely satisfactory. It is also quite useful in the operation of other portable electric tools.

Q. We have a set of glass jar, sealed type storage batteries that have been in service for about four years. The covers sweat considerably and are difficut to keep clean and dry. What remedy is considered best to eliminate this trouble?

A. Probably the best method would be to replace the covers and gaskets around the plate terminals. However, this is a big job and rather expensive. A simple treatment which usually proves effective is to clean the covers frequently with a soda solution. This treatment will probably in time dry out the covers considerably. Care should be taken at all times to prevent the soda solution getting inside the cells.

Q. When a wet spot is located in a cable caused by a small hole in the sheath can the trouble be cleared by applying heat with a blow torch direct to the cable?

A. This is possible if the torch is used in a proper manner. The heat should be applied on dry cable each side of the opening, forcing the moisture toward the hole where it will escape in the form of steam. If the heat is applied to the center of the wet spot it will force moisture back into the cable. This method is not recommended though except for emergency repairs as seldom can all moisture be removed. it is best to open the cable and boil out the moisture.

Q. We are having considerable trouble with ring cuts on aerial cable and would be pleased to know how this can be prevented.

A. We assume that this is on cable which has been in service several years. Cable rings of the present day are greatly improved over what they were a few years ago and ring cuts at the present time are not as a rule frequent. Ring cuts generally occur at two rings each side of the pole where the sway of the span has a tendency to twist the cable in the rings. Saddles can be obtained which slip into the regular ring for use at each pole. Some use longer rings at the pole which have a tendency to reduce the twist in the cable.

Q. During the recent sleet storm we had several poles kick out of the ground without breaking off at the ground level. These poles were set to the required depth but just would not hold the strain placed on them by the sleet load. Is there any possible method by which this could have been prevented?

A. During the recent sleet storm in many localities the ground was not frozen and was thoroughly soaked which made it easier for the poles to kick out. Frequent storm guying seems to be the answer in many cases. It seems also that many of us have not set poles to the proper depth. When guying is not desirable, even new poles may be stubbed to increase their bearing surface on the earth. Or cross logs may be placed on each side of the poles near the surface which should prove effective in most cases.

Q. What is considered the most convenient means of splicing inside house wire?

A. We are of the opinion that the compression type sleeve is entirely satisfactory and is most convenient to use. It also makes a very neat splice.

Q. Is there any possible means of laying a conduit under a street without digging up the street or pushing a pipe?

A. There is available a horizontal type drill which is considered suitable for this purpose. The auger is in sections which can be joined together and is turned by a small gasoline engine.

Q. How can electric fans be best used in a telephone switchboard room?

A. We prefer fans of the stand type for switchboard use because they can be used to conduct the air stream where it is most needed. A good fan should move the require volume of air with very little noise. Numerous fans of this type are now on the market at reasonable prices.

Q. What type of equipment can we purchase for use in the test and repair of telephone transmitters?

A. As we have often stated we do not consider the local repair of transmitters desirable in the average telephone exchange. We suggest that you arrange to return defective transmitters to their manufacturer for repair or replacement.

Q. When telephones have been repaired and cleaned, how should they be stored so that they will keep clean until installed?

A. After trying several systems we have decided on the one of keeping the clean and repaired telephones in a heavy paper bag until needed. This is more convenient than wrapping in paper and is entirely dust proof.

Q. Is the "A" type pole fixture considered satisfactory for telephone use?

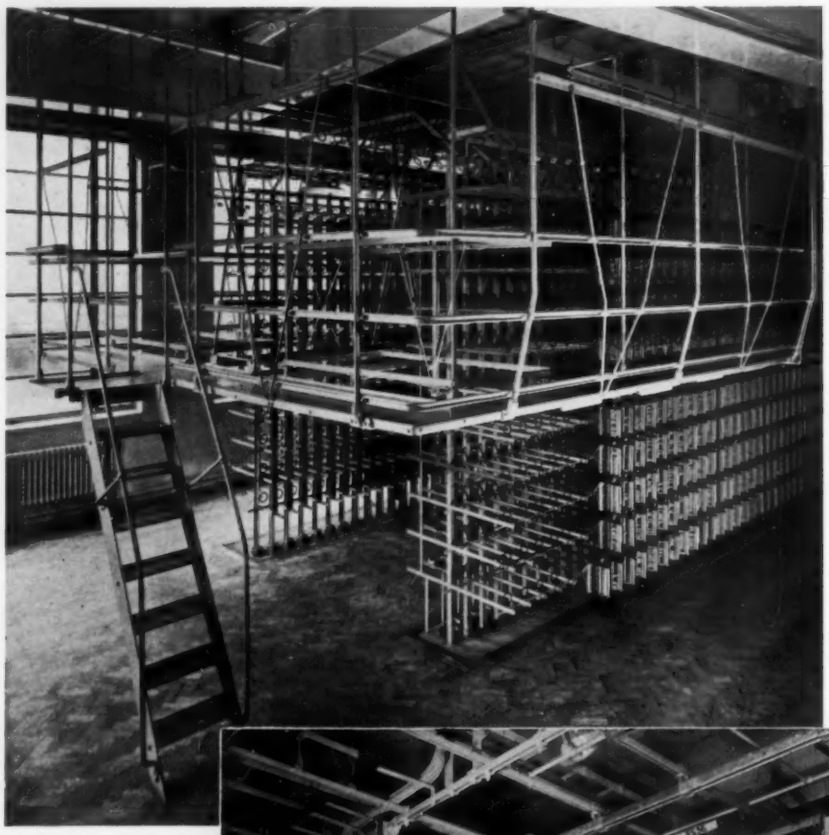
A. Ordinarily it is not as this type fixture requires moving of the pins on the crossarms and the normal wire spacing cannot be used. The "H" fixture is generally considered best for telephone work. This fixture is rapidly coming into general use for corners to reduce guy strain.

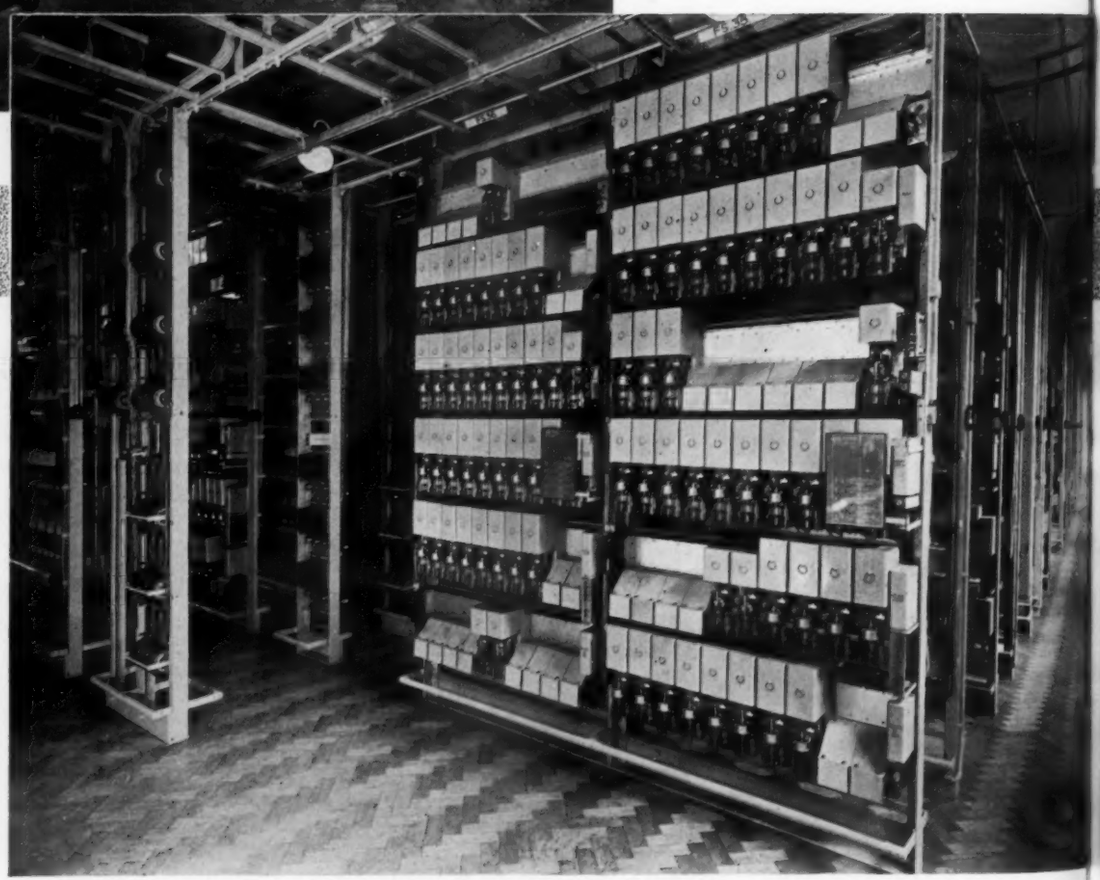
Q. How can a cable terminal best be mounted on a concrete wall inside a building?

A. We first fasten a 1 ft. wide board bout 5 ft. long to the walls with approved type anchors. Then we mount the cable terminal on the board with screws. The cable can be easily cleated to the board and ring runs provided.

Q. Is it generally considered good practice to leave telephones installed in vacant houses?

A. That will depend to a great extent on local conditions. If the instrument is not required for immediate use and the house will probably be occupied again soon it will no doubt be good practice to leave the telephone installed for a month at least. Telephones should not be left in houses not properly locked or otherwise protected.





Top illustration: General view of the Main Distribution Frames Showing the Mezzanine Platforms.

Bottom illustration: General view of Automatic Racks Central Exchange, Birmingham.

IEMENS

MIC TELEPHONES

tr Exchange, rmingham

CENTRAL Exchange, Birmingham, one of the largest exchanges in the Birmingham Director area has recently been brought into service.
The new exchange has capacity for 10,000 lines with initial equipment for 6,500 lines. It is located in Telephone House, which also accommodates the Trunk and Toll Switchboard with 367 operators positions, including the centralised manual board for the whole of the Birmingham area.
The Trunk Switchboard is one of the largest and most important long distance exchanges in the United Kingdom.
The complete equipment for both these exchanges was manufactured and installed by this Company to the order of the British Post Office.

Telephone House, Birmingham.

SIEMENS BROTHERS & CO., LTD.

WOOLWICH, S.E.18, ENGLAND.

Representation Abroad: AFRICA: Cape Town, Durban, Johannesburg, Port Elizabeth, Cairo, Ndola, Bulawayo, Nairobi, Mombasa, Kitale, Kaamega Dar-es-Salaam. ASIA: Calcutta, Bombay, Madras, Colombo, Ipoh, Kuala Lumpur, Seremban, Singapore, Penang, Malacca, Sarawak, Shanghai. AUSTRALIA: Melbourne, Sydney, Brisbane, Adelaide, Perth (W.A.), Newcastle (N.S.W.), Hobart, Launceston, Wellington, Auckland, Dunedin. CANADA: Winnipeg. BRAZIL: Rio de Janeiro.

This modern business office is typical of the facilities the Logansport exchange provides for its customers.

New Automatic Switchboard for Logansport

AFTER several month's informal study of subscribers' reactions, Mr. Frank O. Cuppy, Vice President and General Manager of the Indiana Associated Telephone Corporation last week described as an unqualified success the new 2400 line Strowger Automatic telephone exchange at Logansport, Indiana.

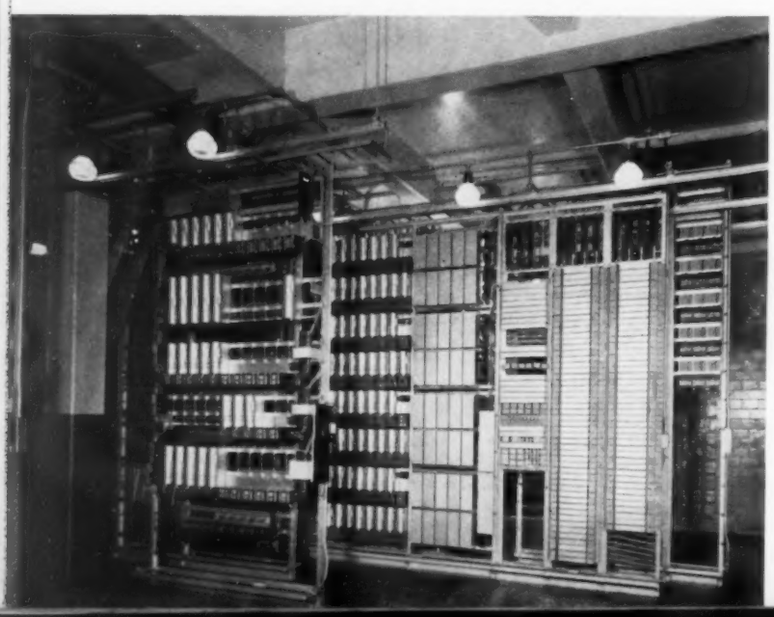
"The reception our subscribers are according this new equipment is just as favorable at it was in LaFayette when we made a larger installation of the same type several years ago" said Mr. Cuppy. This was the opinion also of Walter Dakin, of Madison, Wisconsin, General Plant Superintendent of the Associated Company. The new equipment was put in service on May 21, when the Logansport exchange was moved into a new modern, three story building.

High spot of the past two month's operations was the open house inspection by the public on June the 8th, —at which Wilbur Van Horn, manager of the Logansport exchange, together with the local and state organizations, was host to the many visitors who toured the new plant. It was here that the enthusiastic comments of subscribers reached their peak, as they marveled at the better-than-human switches that had been making their connections for them.

● To many visitors, an especially appealing feature of the building was the business office, made unusually attractive, as the accompanying photograph shows, by a skillful combination of glass brick, attractive fittings, and modern lighting. Doorless telephone booths, lined with sound absorbing materials, were another feature of the office that evoked comment.

The switching equipment is located on the top floor of the three story windowless building. Glass brick is used extensively for illumination, providing light without dust or dampness. A forced air circulating system assures thorough ventilation, with provision for heating and cooling.

UNIQUE among the features of the building is the location of the cable vault on the roof, directly over the distributing frame. Because the exchange is on the third floor, the cost of textile insulated cables run directly from a basement cable vault would be considerably greater than that of carrying the paper covered cables up to the roof, and dropping short terminating cables to the distributing frame below.



Line finders and relay rack in new Logansport step-by-step automatic exchange.

The Strowger Automatic equipment was built and installed by Automatic Electric Company, Chicago. Using 200 point line-finders, the system provides service initially for 2400 lines. All standard services are offered, including individual, two-party, four-party, five-party, ten-party, consecutive number (P-B-X) and pay station, all on a full automatic basis. Five-frequency harmonic converters provide for full-selective ringing on party lines, with bridged or grounded ringers. Telephone numbers are four digits, except for ten party lines, which require five digits.

Individual and ten party lines are served by 100 line connectors, while connectors serving two—, four,— and five-party lines are of the 200 line type, the minor switch on each connector selecting not only the harmonic frequency but also the proper 100 line group. The usual "reverting-call" facilities are provided for automatically completing connections between two parties on the same line.

● Toll service is provided through the toll board of the Indiana Bell Telephone Company, which is in the same building. The toll operator is reached by dialing "10", which lights a lamp on the toll board, and the calling party receives a "ring-back tone", as an indication that the operator is being signalled. If a toll call is attempted from a line on which toll service is to be denied, a "splash" of tone is heard in the operator's receiver when she picks up the call, to warn her that service should not be given without the approval of a supervisor.

A special train of switches is used for incoming toll calls and delayed outgoing calls. The operator secures connection through these switches, by dialing the regular directory number. Ringing is controlled by the operator, so that on delayed calls the operator may establish the local connections and then proceed to complete the connection at the distant end before recalling the local party. The toll

switch train provides a flashing "busy" signal for the operator when an incoming call is attempted to a busy line. It includes also a coin-control feature, which is required on delayed outgoing calls from paystations.

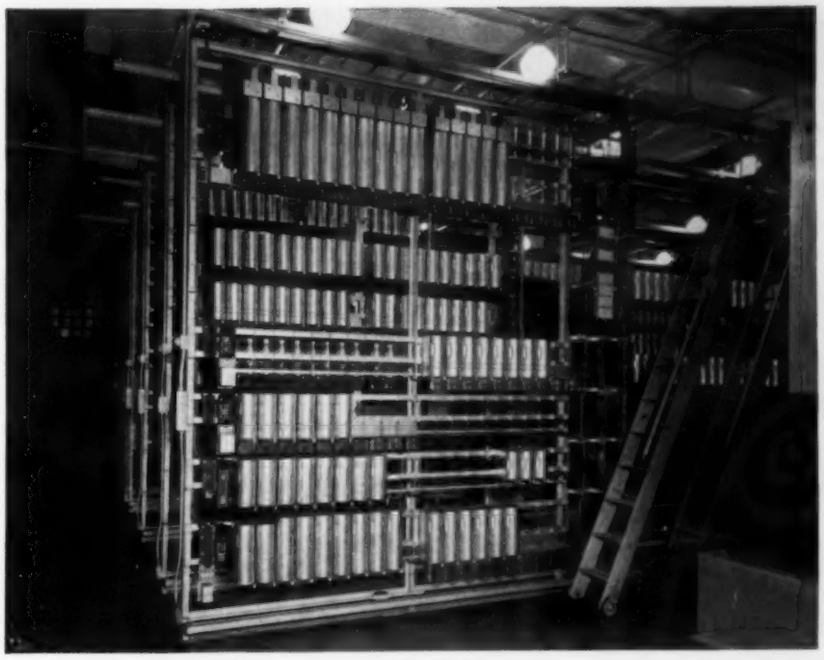
Calls from four outlying magneto exchanges—Walton, Galveston, Young America, and Lucerne—are handled automatically, through one-way "pulse correcting" repeaters and the regular line equipment. Operators at the magneto exchanges dial regular directory numbers, and receive disconnect supervision when the called party replaces his receiver.

A combined main, line, and trunk intermediate distributing frame of 23 uprights provides for distribution of incoming cabling, and cabling between switch groups. The frame is of the "B" type, and is equipped initially with 4348 pairs of protectors.

POWER equipment for the Logansport exchange includes a storage battery with CEMF cells, a 12 ampere tube-type rectifier, a motor generator set, an engine generator set for emergency use, and two sets of ringing generators, one arranged to operate from 110-V A. C., the other from the exchange battery.

Miscellaneous equipment of the exchange includes toll and local test racks, a one position repair clerk's desk, a two position information desk, and a new and simplified type of intercepting equipment through which calls to dead levels, unassigned numbers and changed numbers are automatically routed directly to the information operators.

The Strowger automatic switches are mounted on one-sided frames, eleven feet, eight inches high, provided with rolling ladders. In addition to the main lighting system, which includes special ceiling units of modern design, an auxiliary system of emergency light is provided, for operation on the 48 volt exchange supply in the event of commercial current failure. These emergency lights are automatically switched into service by means of Automatic Electric relays. **(END)**



Rolling ladders give easy access to all equipment on the selector racks.

Bronze Plaque For Walter J. Uhl

The beautiful new three story building of the Indiana Associated Telephone Corp. at Logansport, Indiana, was opened to the public June 8. One of the first things to be seen on entering the lobby is a bronze plaque commemorating the founder of telephone service in that city, the late Walter J. Uhl.

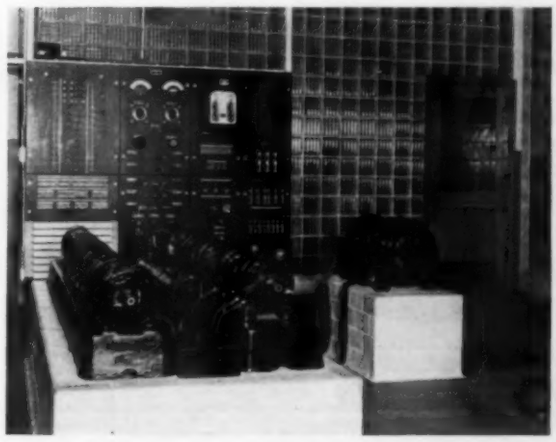
The tribute, inscribed on a bronze plaque, bears the name "Walter J. Uhl," followed by the dates of his life, "1867-1937," and the following memorial, "This organization pays tribute to one who organized independent telephony in Logansport and faithfully served it for thirty-six years, 1901-1937."

Thus are recognized the untiring efforts of the late Mr. Uhl to bring to Logansport the most modern telephonic equipment yet devised as well as one of the most beautiful structures ever erected in a city of that size to house its telephone headquarters.

Phone Change On West Coast

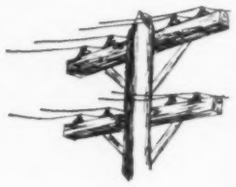
Sandy, Ore., July 23.—Subscribers representing three fourths of the Sandy Telephone company stock voted Friday to accept the proposal of the West Coast company and retire from the field.

Under the agreement the Sandy company turns over a 20-year franchise next January 1. The money subscribed by the Sandy company, about $7,500, which has been held in escrow in the Sandy bank for several months, will be returned to subscribers. The West Coast agreed to reimburse the local company for all expenses incurred during the organization, and both sides settled their differences amicably without court proceedings.



Modern glass-brick wall forms an appropriate background for installation of latest type power board, charging machine, and ringing converters.

LONG LINES



R. A. Clark, Jr.

MUCH has been written about transmission equivalents and testing of telephone circuits and long lines, however little has been said about the transmitters and receivers used on each subset. The heart of the telephone system is right at the transmitter and receiver and if these units are not in good condition efficient circuit maintenance will be of no avail.

The usual method of testing transmitters and receivers is the familiar talking test. If in the opinion of the maintainer the equipment talks it is said to be satisfactory. However, such a test is not reliable and the equipment may be down as much as 10 db without the maintainer being able to tell it.

Much development work has been done in recent years to improve the transmission properties of long telephone lines, however very little improvement has been made in the subsets. Within the last year or so a marked improvement has been made in the transmitter and induction coil on common battery subsets. However, we still have with us the old style (and to my mind obsolete) open core type induction coil. This unit is particularly bad from a frequency standpoint and the crosstalk is very severe if two subsets are placed within several feet of each other. The poor frequency characteristic is due to the low primary inductance. This results in a great drop in response at frequencies below about 500 cycles. For efficient operation especially with the new type transmitters the primary inductance should be increased at least ten times. There is no necessity whatsoever for an open core type coil the closed core type being entirely adequate and free from crosstalk trouble.

● The testing of a transmitter and its associated subset is not difficult if a transmission set is available. Fig. 1 shows a simple arrangement for such work. The transmission measuring set "send" terminals are connected to a small loud speaker preferably a 6 in. p. m. dynamic with a baffle having an opening of about 4 in. The transformer between the speaker and transmission set is required to match the impedance of the two. The transmitter under test is placed at a given distance from the loud speaker preferably about 2 in. A jig arrangement should be provided so that this distance may be maintained for all units. The line terminals of the subset are connected back to the "loop" terminals of the transmission measuring set. A standard loop transmission measurement is then made. Tests should be made at several frequencies throughout the voice range. Frequency tests at 300, 500, 1000, 1500, 2000, and 3000 cycles are adequate. The older type transmitters will appear poor at both ends of the frequency spectrum. The newer type high efficiency, high quality transmitters respond very well if used with a good induction coil. The maximum output of various type subsets will range from about —5 to as high as +15. Table 1 shows representative values for equipment most commonly used.

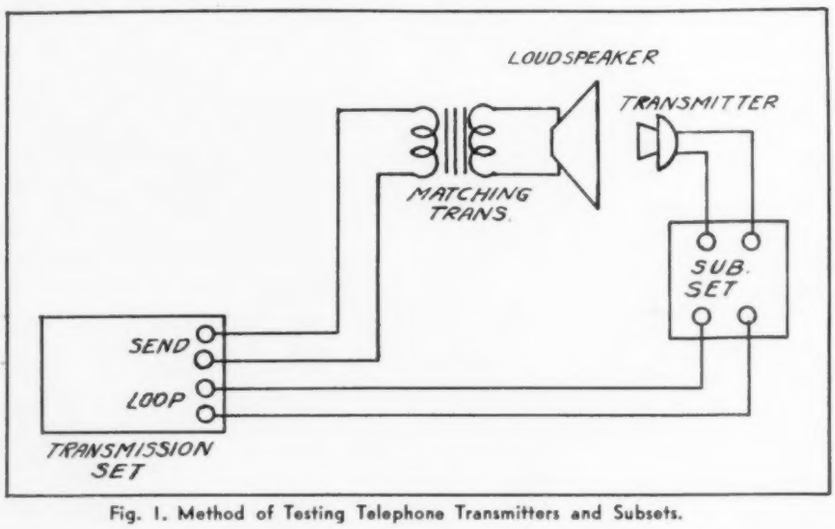


Fig. 1. Method of Testing Telephone Transmitters and Subsets.

Table 1—Output Of Subsets

Type	DB Output
Common Battery Old Style	— 2 to + 2
Common Battery High Efficiency	+ 3 to + 8
Local Battery Old Style	0 to + 5
Local Battery High Efficiency	+ 5 to +10
Dispatchers Anti-side Tone	+ 8 to +12
Way Station	+10 to +15

AN accurate test of telephone receivers is somewhat more difficult than on transmitters and involves the use of a microphone and an amplifier. A given signal is impressed on the receiver and its audio output measured through the microphone pickup. A microphone such as the crystal type is necessary in order that the response be uniform throughout the frequency band.

A somewhat simple method consists merely impressing a given signal on the receiver in question and then on a receiver that is known to be good. Comparison of the two can be made by a simple listening test. The test should be made with a subset associated with a receiver so that the proper impedance match is obtained. Receivers in general give less trouble than transmitters and therefore an accurate test is not so necessary. The method described above has been used for several years and will yield reliable results with a little experience.

No. 1197 Handset Telephone for use in home or office on desk or table. Desk set box is mounted nearby on the wall where it can be reached easily by subscriber.

No. D-2843 Handset Type Magneto Wall Telephone gives the users of magneto wall telephones all the wonderful convenience plus the superior transmission and reception qualities of the modern one-unit instrument.

Builders of Business for Rural Companies

STROMBERG-CARLSON MAGNETO HANDSETS

THE DAY is past when the rural dweller is satisfied with fewer conveniences than his city cousin. Both the small town and the farmer have gone modern. Probably no place is this emphasized to a greater extent than in magneto telephone service.

Operating companies offering Stromberg-Carlson Magneto Handsets find that these instruments are a powerful means of breaking down sales resistance and a big help in obtaining new subscribers. Attractive and modern appearance combine with superior transmission and increased convenience to delight subscribers.

Order test samples of any one of the Stromberg-Carlson Magneto Handsets shown on this page. You will find them business-builders.

No. D-2844 Handset Type Magneto Wall Telephone, for mounting on wall near desk. A convenient single piece unit with handset suspended from a hook switch at the side of a golden oak cabinet. Convenient for use where the subscriber does not wish to have a telephone on the desk or table.

STROMBERG-CARLSON TELEPHONE MANUFACTURING CO.
FACTORY AND GENERAL OFFICES: 100 CARLSON ROAD, ROCHESTER, N. Y., U. S. A.
BRANCH OFFICES: CHICAGO, KANSAS CITY, SAN FRANCISCO, TORONTO

Stromberg-Carlson

MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR MORE THAN FORTY YEARS

Coordination of Telephone and REA Power Lines

(Continued from page 18)

voltage induced in the two wires would be nearly identical and there would be little noise, but with the two sides of the circuit widely separated, a much larger difference in induced power voltage exists to create noise. Fig. 4 brings out this fact.

The Two Wire Metallic Circuit

In considering the inductive susceptiveness of open wire metalic rural circuits, we find that there are four types of metallic circuits, each of which has a different susceptiveness to induced noise. These types are, viz:

(1) a completely balanced and isolated circuit,
(2) metallic lines employing a grounded signaling arrangement,
(3) metallic lines with grounded ringers,
(4) phamton circuits.

THE completely balanced two wire metallic line has the lowest inductive susceptiveness of any of the four types. If properly transposed and maintained, it is capable of operating in extensive power parallels without severe noise. Metallic lines with grounded signalling are those that the telephone companies have developed in recent years to provide an improved grade of rural service. In general, they permit the subscriber to signal the operator secretly without ringing any of the bells on the line. This is accomplished by a circuit as shown in figure 5 in which the generator is connected to ground when the button is pressed and with the line drop or relay connected at all times to one side of the line to ground except when the cord circuit plug is inserted in the subscribers jack. This type of telephone circuit, due to the unbalance created by the central office drop, will have considerable noise induced in it where involved in a substantial power parallel. As will later be discussed, remedial measures are available to correct this condition and still permit the desirable features of the signaling arrangement to be retained.

Metallic Lines with Grounded Ringers

Metallic lines with grounded ringers are those which operate on a *divided ringing basis* and which may have one or more ringers connected from each side of the line to ground. These ringers have the same effect on the line as would a high resistance ground, tending to unbalance it and to permit the power voltages induced on the two telephone wires to pass an unequal current along the wires to ground thereby creating noise in the line. As will later be discussed remedial measures are available also for this type of signaling. This type of line is shown in fig. 6.

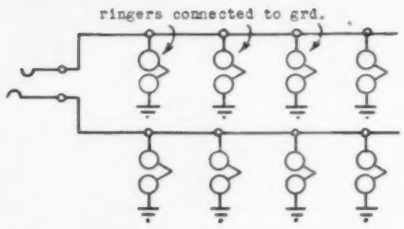


Figure 6—Rural Metallic Lines with Divided Ringing

Balanced phantom circuits are classified as a separate group from the completely balanced metallic physical circuit, inasmuch as the phantom circuit is always more susceptive to inductive interference than is the purely physical circuit and somewhat different treatment is required to transpose the phantom circuit so as to keep it free from noise, hence, it is considered as a separate type.

● City and rural cable lines are mentioned in a special group as in some cases inductive problems may result where cables are paralleled by city distribution systems carrying large load currents and where the power system is of a *common neutral type*. Inasmuch as this is not a typical problem it will not be given further consideration in this article.

(To be continued)

Michigan Meeting

(Continued from page 21)

the proposed amendment to the Rural Electrification Act introduced in the house of Congress during this past session. The third recommended to the directors that district meeting be held in 8 districts of the State this Fall.

Re-election of all directors and officers for the coming 12 months was decided during the closing session. They were: President, O. M. Vaughan, South Haven; vice-president, W. J. Melchers, Sr., Owosso; and secretary-treasurer, Jane McNally, Lansing.

Directors: District No. 1, H. R. Christianson, Muskegon, and R. C. Smith, Homer; District No. 2, Chas. W. Cheeney, Chesaning, H. S. Bradstreet, Rollin, and W. R. Stafford, Port Hope. District No. 3, B. R. Sage, Central Lake, and Ernest Sprague, Lake City. District No. 4, P. E. Taylor, Pickford.

Speakers were President Vaughan; W. H. Beck, of Indianapolis, secretary-treasurer of the Indiana Telephone Association; J. A. Bridgeman, of Owosso; B. J. O'Connell, Michigan Bell Telephone Company; W. J. Melchors, Owosso; Louis Pitcher, executive vice president of the United States Independent Telphone Association, Chicago; R. E. Palmer, of Lansing; R. Foulkrod, Detroit; Chester M. Martin of Detroit; H. B. MacMeal, Chicago; Charles S. Porritt; C. C. Deering, Des Moines, secretary-treasurer of the United States Independent Telephone Association and Ranford Dunlap who led the discussion on the proposed Class C accounting system of the FCC. The officials of the Association are to be congratulated on the well rounded program for 1938. Those in attendance were loud in their praise of the hospitality and social enjoyment the meeting afforded.

Telephone Engineer

Dear Sirs:

I have read with interest the articles on Local Test Desk Operation by C. F. Curtiss, and would like to know if its possible to get a complete copy of these articles. What articles we have read, have been a great assistance in helping to use our Test Set.

Kindly let us know, if its possible to get the complete set, also price of same.

and oblige

Yours Truly

Douglas Carrie,

Keewatin Telephone System

Keewatin, Ontario, Canada.

Death Takes A. Z. Hageman

A. Z. Hageman, 56, of Lorain, Ohio, president of the Lorain Telephone Company, died July 3rd at Lorain from a heart attack.

One of the founders of ship-to-shore telephone service on the Great Lakes, Mr. Hageman and his brother, Herman E. Hageman, who is treasurer of the Lorain Company, started the Lorain County Radio Corporation in 1928. In 1933 ship-to-shore service started until today it serves almost a hundred ships on the Great Lakes.

As a charter member of the Independent Pioneer Telephone Association of the United States, Mr. Hageman paid close attention to Association affairs. Long a familiar figure at the annual convention of the Ohio Independent Telephone Association and the United States Independent Telephone Association, he was known by the entire telephone industry as a hard worker until his death which occurred while he was still active. Survivors are his widow and his brother Herman.

(Continued from page 19)

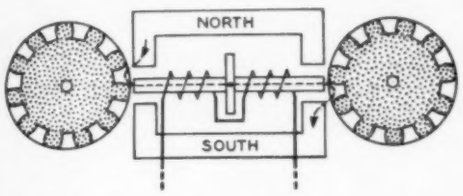


Fig. 3—The signalling current is generated by rotating two discs wih teeth of magnetic material in the field of the telephone magnet.

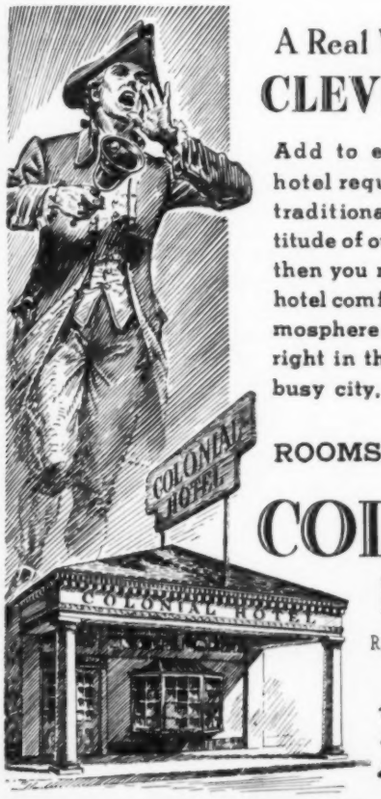
differs only in the lack of signaling facilities. Removing the receiver from its mounting transfers the telephone from the signalling to the talking circuit and, in order to prevent signalling under talking conditions, short-circuits the line when the signalling crank is turned. A switch is provided to connect the set to any of six outgoing lines. This telephone being designed primarily for installation on shipboard, is watertight and in shown on page 282.

These new magnetic telephones are not intended for connection with Bell System private-branch exchange or central-office service but their quality and efficiency makes them useful for inter-communication service where compactness, independence of external power, and ease of installation are important.

Fig. 4—The combined transmitter and receiver is three inches square and weighs less than two pounds.

Exide
BATTERIES
for every Telephone Service
THE ELECTRIC STORAGE BATTERY CO., Philadelphia
World's largest manufacturers of storage batteries for every purpose.

WB
QUALITY WIRE And CORD Since 1900
Distributed and Recommended by GraybaR ELECTRIC COMPANY
The WHITNEY BLAKE CO.
NEW HAVEN CONN.



A Real Welcome in
CLEVELAND
Add to every known hotel requirement, the traditional friendly attitude of our entire staff, then you not only have hotel comforts but an atmosphere of relaxation right in the center of a busy city.
ROOMS from $1.75
COLONIAL HOTEL
RANDALL M. LEWIS
Manager
An Ideal Location at E. 6th St. between Euclid and Prospect

SUB-CYCLE
The MASTER Ringing Converter

Model "S"
PRICE $45.00
Equipped with Pulsator for Biased Ringing $55.00
Output 20 Watts, 90 Volts
Operates on 110 Volts A.C.

TRUSTWORTHY
CONTINUOUS
SERVICE
•
NO MOVING PARTS
NO VIBRATING CONTACTS
NO ROUTINE MAINTENANCE
NO RADIO INTERFERENCE
•
Use It With Assurance

(For loads 40/50 watts, write for information about Model "C.")
LORAIN PRODUCTS CORPORATION, LORAIN, OHIO
Lorain Products Corporation is exclusive manufacturer for use and sale in United States. Address foreign inquiries to Automatic Electric Sales Co., Ltd., Chicago, Ill.
SOLD BY LEADING DISTRIBUTORS

Local Test Desk Operation

Fundamentals of Telephone Transmission

PART XIV

By

C. F. CURTISS

IN considering the fundamentals of telephone transmission in connection with local test desk operation it seems best to first study certain of the elements of a transmission system. Every electrical transmission system consists of three principal elements: (1) A source of electrical energy. (2) Suitable means for transmitting this energy to the point of use. (3) A device for converting the electrical energy received to a form more useful.

In a telephone connection the energy of the speakers voice is converted into electrical form by means of the telephone transmitter. The line circuit from the speaker to the listener, with it's associated equipment in the central office and the receiver at the listener's telephone are the devices for utilizing the electrical energy received and transforming it into the most useful form, that is, in this case, into sound waves which will affect the listener's ear.

● When the testman speaks into the test desk transmitter, the person at the other end of the line must be able to understand what the testman says. In order that this may be accomplished, it is necessary that the testman's voice be carried distinctly and that it reaches the listener's ear with sufficient volume to be heard without undue ear strain.

It should not be lost sight of that under all conditions a portion of the electrical energy flowing from the generating device is lost in transmission, and does not reach the receiving apparatus.

As it is well known, the transmission of speech by the telephone is brought about by means of variable or fluctuating alternating electric currents, any circuit used for speech transmission possesses the following properties: (1) Resistance, that is, each conductor which is part of the circuit opposes the flow of current. (2) Inductance, the increasing and decreasing magnetic lines of force produced by the alternating current cutting across the conductors carrying the current, thereby setting up an E. M. F. which is in the opposite direction to the applied voltage. The inductance of the circuit is a measure of the amount of counter E. M. F. which will be obtained with a certain amount of current at a definite frequency. For example, with a current of 100 milliamperes at a frequency of 800 cycles the counter E. M. F. in a circuit containing an inductance of 150 millihenries will be twice as great as that in a circuit having the same current value at the same frequency, but having an inductance of 75 millihenries.

THE inductance of a telephone circuit in a nonloaded cable is very small due to the fact that the cable conductors are so close together that the lines of magnetic force produced by the current flowing in one conductor of a cable pair is neutralized by those produced by the current flowing in the other conductor. (3) Capacitance, the two conductors of a telephone circuit and the insulating material between them, act as a condenser and possesses a certain amount of capacity. (4) Conductance or leakage ,since it is almost impossible to perfectly insulate one conductor of a circuit from the other a small amount of current will pass from one side of the circuit to the other. The amount of current that will flow across is determined by the amount of the conductance of the circuit. The amount of leakage current increases as the conductance increases. However, in general, the conductance of telephone circuits is extremely small and usually is neglected.

Conductance is a term used to indicate conducting power for electricity. In a direct current circuit the conductance represents the ratio of the current value to the E. M. F. In an alternating current circuit the quantity whose square added to the square of the susceptance is equal to the square of the admittance.

Conductance is the reciprocal of resistance.

● Figure 1 illustrates the manner in which a telephone line may be represented by a single value of resistance, (R), inductance, (L) capacitance, (C) and conductance, (G) which are equivalent to the values of the quantities as they are distributed over the circuit. If an alternating source of E. M. F. is connected to points "A and B", a certain amount of current will flow. Part of this current will flow through the condenser "C" and conductance "G" shown for each mile.

The current passing from "C to D" through the telephone receiver will therefor be less than that supplied at the source. The sound produced by the receiver will be less at points "C and D" than it would be if connected directly to the source at points "A and B". The introduction of the transmission circuit has consequently caused a loss in the amount of current flowing through the receiver, which is spoken of as a transmission loss. This factor and another called the battery supply loss, determine the distance any subscriber's station may be located from the central office. The sum of the transmission loss and the battery supply loss gives the total loss occuring in a subscriber's station loop when the telephone is in use and termed the "loop loss."

The rate at which the current at the transmitting end of the telephone line decreases along the circuit depends upon what is called the attenuation constant of the line. Ordinarily the rates at which the current dies along a telephone line circuit depends upon it's frequency. Cur-

(Please turn to page 38)

For every cable problem

. . . the right answer, promptly!

Whether you need telephone cable for overhead, under water, underground in duct or buried directly in the ground, you can count on Western Electric to make it right and deliver it on time.

Lead covered—impregnated jute protected—tape armored—wire armored submarine—textile insulated and cellulose acetate lacquered terminating cables all are made by cable specialists, and tested with never ending care.

Western Electric cable is safeguarding millions of miles of telephone lines. It will help you give better service to your subscribers—year in, year out! Talk over your cable problems with Graybar's nearest branch.

Western Electric

Distributed by Graybar

Distributed by GRAYBAR Electric Company In Canada: Northern Electric Co., Ltd.

LEAD COVERED CABLE AND TELEPHONE APPARATUS

Local Test Operation

(Continued from page 36)

rents of high frequency die out or are attenuated faster than those with a low frequency. The attentuation constant for a certain frequency, as the name implies does not change so long as the character of the line circuit does not change. It's value at each frequency depends upon the values of the resistance, inductance, capacitance, and conductance for the circuit involved, and upon the frequency.

Since the capacitance between conductors in t[illegible]phone cables is higher than in open fire telephone line circuits, the attenuation constant for cable is higher, which means that the current dies faster, and makes it difficult to talk through very long cables unless they are loaded, that is, have inductance coils placed in series with the cable conductors at regular intervals. The introduction of the inductance coil decreases the attentuation constant and therefore makes it possible to talk over great lengths of cable.

● The unit which is universally applicable in practice to compare the transmission losses in varies circuits or pieces of telephone equipment is a unit expressing the logarithmic ratios of powers, voltages or electric currents in a telephone transmission system called the decibel, and is equal to 1/10 bel.

One bel is equal to the equation $2 \log_{10} E_1/E_2 = 2 \text{ Log}_{10} I_1/I_2$.

In the application of this transmission unit the effect of any portion of a circuit in reducing the volume of transmission can be expressed in terms of miles of standard cable as follows: The current in the circuit flowing into the portion of the circuit whose loss it is desired to ascertain, and the current leaving, can be obtained by calculation. The ration of these two currents will give a certain decimal. The number of miles of standard cable which has the same ratio output and input will be the equivalent transmission loss of that part of the circuit being investigated.

Rambler Rambles Again

By J. A. SMITH

During July, Rambler, the missus and daughter rambled around Lake Michigan, fishing here and there, sightseeing at other places and seeing the "north woods" for the first time. 'Tisn't necessary to try to tell you about the sights—most of you probably know what's to be seen better than the writer.

▼ ▼ ▼

We'd been told many times that wild game, such as deer, bear, etc., roamed at large in the upper section of Uncle Sam's domain, and that they could be seen any day from the highways. Well, I'm here to tell you that there is an exaggeration somewhere, a colored Ethiopian in the kindling box, or what have you.

While the women fished Rambler nosed around the dense forests in Northern Michigan, poking his cane in places where the aforementioned animals were supposed to hibernate, but nary a one did we see, except the Texas cottontail and similar animals that infest densely populated sections of the country and known as domestic animals.

▼ ▼ ▼

Not that we were particularly anxious to meet face to face one or more of the grizzly tribe, for honestly, we had picked a line of least resistence in case such an emergency did arise, but being of the Doubting Thomas tribe, we did want to get our money's worth.

▼ ▼ ▼

Ideal weather prevailed and the fish were accommodating. While none of them actually jumped into our boat without an invitation, they were anxiously awaiting our arrival and did themselves proud during our stay in their territory. We followed U. S. 31 to Mackinaw where we crossed the channel to St. Ignace, then west on U. S. 2 to the west side of Lake Michigan: south to Chicago on U. S. 41. Rambler found fishing best north of Lake Michigan.

Prominently displayed at places where fishing bait was offered for sale could be seen a license issued by the state of Michigan authorizing said place to catch, sell, offer for sale or otherwise dispose of certain live bait for the purpose of catching fish, attempting to catch or otherwise entice them into placing their destiny in your hands.

▼ ▼ ▼

North of Lake Michigan we found flowing wells with water bordering on the freezing point; at least it felt that way to us. We were told that some of these wells flowed water with a temperature as low as 35 degrees, while others showed 40 degrees. Anyway bathing in well water was out. Fire in the stove at night and during the early morning hours was somewhat different from our Texas trip one month previous.

▼ ▼ ▼

On the last lap of our homeward drive we stopped over at Clintonville, Wis., where we visited our old friend, F. M. Higgins of the Four-Wheel Drive Automobile company. Others in the organization were presented by Mr. Higgins, and an enjoyable visit was completed all too quickly.

▼ ▼ ▼

While the family fished over in Central Michigan, Rambler took a day off to visit the pre-convention golf matches of the Michigan Independent Telephone convention, scheduled for Lansing July 27th and 28th. While at the Country Club we conversed with President Vaughn and Vice President Melchers regarding matters to come before the convention; this information will be found in the convention writeup.

▼ ▼ ▼

W. J. Melchers of Owosso, Michigan mentioned the fact that some time last year he had talked with W. S. Vivian, former secretary of the United States Independent Telephone association. For the past several years Vivian has made Michigan his home. It is understood that he lives near Ludington. After leaving the National Association Vivian joined forces with the Insull interests where he became a vice president with offices in Chicago. After the Insull crash he moved to Michigan where he is said he is enjoying farm life.

▼ ▼ ▼

W. T. King, telephone consultant, was making himself useful around the Olds hotel in Lansing and on the golf course. King has worked for a number of years in Michigan in different capacities, but for the past three years he has been on his own and is now finishing a job for the Tri-County Telephone company at South Haven. King is a former Texan and his language was easily understood by Rambler.

THE PHILLIPS PLANT AT BROCKVILLE, ONTARIO

WIRES AND CABLES OF HIGHEST QUALITY

With one of the most modern and comprehensive plants for wire and cable fabrication in the world, the experienced PHILLIPS organization can supply every requirement for telephone, telegraph and power work.

For almost half a century, PHILLIPS wire and cable products have been noted for undeviating high quality. Year in and year out, through the heat of summer and storms of winter, they can always be relied upon to deliver the utmost in unfailing performance and reliable operation.

Write for prices and technical data on PHILLIPS wires and cables—full information sent promptly upon request.

PHILLIPS Products Also Include:

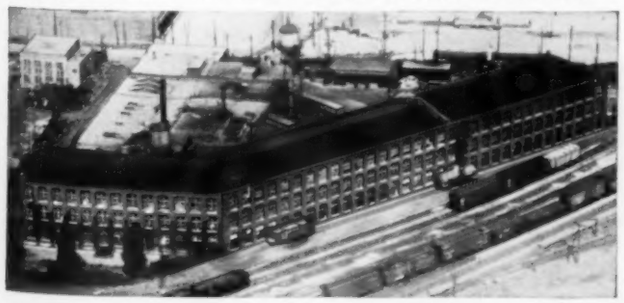
A complete range of telephone instruments, telephone switching equipment for public and private exchanges, and telephone protective apparatus.

PHILLIPS

WIRES AND CABLES

Brockville, Ontario, Canada

Distributors for Canada:
CANADIAN TELEPHONES & SUPPLIES LIMITED
284 King Street West, Toronto
WINNIPEG MONTREAL REGINA BROCKVILLE VANCOUVER
Export Distributors: Automatic Electric Sales Company, Limited, Chicago



THE PHILLIPS CABLE PLANT AT MONTREAL, QUEBEC

AN ORDER WE CAN FILL

. . . Every electrical supply a telephone company needs

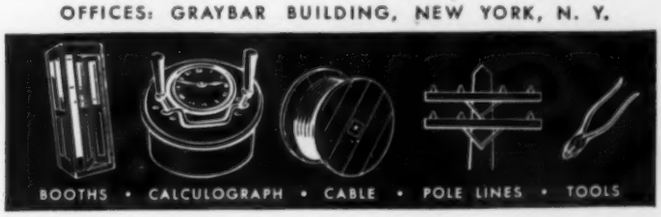
Whatever electrical item you may need, you'll find it quickly available from Graybar. Graybar provides a complete, convenient source of all exchange supplies as well as everything electrical for the outside plant—wire and cable . . . booths . . . tools . . . poles and crossarms, and complete pole line materials.

Graybar's long experience . . . and its reputation for dependability going back as far as 1869 . . . is your assurance of *reliability* in every product.

Distributed and guaranteed by Graybar Electric Company

GraybaR

OFFICES IN 85 PRINCIPAL CITIES . . . EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.



These TICKLED Us!

This is T. E. broadcasting. The following department comes to you through the courtesy of Rambler. How long this department continues is up to you. In the June issue Rambler suggested such a column and the response has been very generous. If you like this department send in your favorite joke and in this way keep the department alive. We're expecting to hear from YOU!

H. M. Stewart, secretary of the Pennsylvania State Telephone Association, and former Texan, sends us the following dialog between two citizens of different political faith:

A Yankee Republican who spent the Winter in the deep South was quite surprised to hear so many staunch southern Democrats severely criticising the so-called New Deal. One day he approached the local crossroads storekeeper friend with the question,

"'I must confess I do not understand your pronounced antipathy towards the New Deal. You voted for the Administration in 1932, didn't you?"

Local Storekeeper Friend: "Yes, we are Democrats down here and we vote Democratic."

Yankee Republican: "You voted to reelect the Administration in 1936, didn't you?"

L. S. F.: "Yes, I tell you we are Democrats down here and we stick to the Democratic ticket."

Y. R.: "Well, I hear there is some talk of the present Administration running for a third term in 1940. Would you vote for it again then?"

"Hell yes, I tell you we are Democrats and we stick to the Democratic ticket; but I'll tell you one thing, Hell is going to be the highest place this country can look if you Damn Yankee Republicans don't stop voting the Democratic ticket."

▼ ▼ ▼

Oscar Burton, president of the Texas Telephone Association, Tyler, Texas, suggests that it might be more appropos for us to give jokes of telephone happenings or actual historical incidents of the telephone industry. He therefore sends us the following:

"A few years ago we received a long distance telephone call at our Athens office for a party who was deaf and dumb. This information was reported to the calling party. He then selected an alternate who was reported in jail. The second alternate was confined to bed with several broken bones, and unable to talk; whereupon the calling party inquired if there was anyone in the city of Athens available to the telephone."

▼ ▼ ▼

W. C. Dillon of W. C. Dillon & Company, anchor manufacturers, Chicago, furnishes us with the following, which he claims came to him via the grapevine route from South America:

"The president was on the final lap of his recent fishing trip; the fish had quit biting and something heroic had to be done. With his chin up the president advanced to the side of the boat, threw both hands out in his usual striking pose and began:—"My frans—" He got no further; twenty large suckers jumped on deck."

▼ ▼ ▼

One of the first response to our suggestion was genial P. Kerr Higgins of University City, Mo. Mr. Higgins mails us the following:

A doctor had an urgent phone call from a gentleman saying his small son had swallowed his fountain pen.

"All right! I'll come at once," replied the doctor. "What are you doing in the meantime?"

Whereto came the unexpected answer, "Using a pencil."

▼ ▼ ▼

Al Thomass, star salesman for the J. H. Bunnell Company, New York, sends in the following suggestion for prospective grooms:

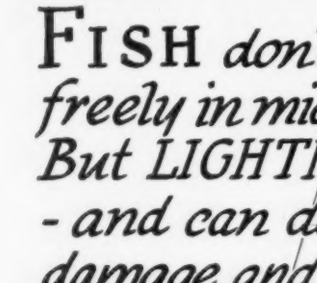
Boy: "And now, doctor, that I've told you I am going to marry Anne, there's one thing I want to get off my chest."

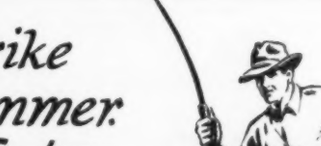
Doctor: "You just tell me about it, my boy."

Boy: "A tattooed heart with the name Mabel on it."

FISH *don't strike freely in mid-summer. But LIGHTNING does - and can do a lot of damage and seriously interrupt service.*

Protect your plant against damage and interruptions by using Cook True Gap Dischargers that will not ground the line.





COOK ELECTRIC CO.
2700 Southport Ave. Chicago

Effect of Wage and Hour Bill

(Continued from page 20)

The drastic effect this Act will have on the thousands of small exchanges operating one-position switchboards can readily be visualized when it is considered that to give 24-hour telephone service the first wage increase will mean that annual traffic wages will amount to $2,190.00; the second wage increase will result in a $2,628.00 annual Traffic payroll and the third and final increase will bring the traffic payroll to $3,504.00.

If Independents are exempt from the Act, it does, however, serve as a forewarning as to the possible trend of future State wage and hour legislation. In this day and age when state administrations are so completely dominated by Washington it would not be surprising if state legislatures endeavor to enact similar laws. In fact, Roland C. Davies, our Washington correspondent, mentions on another page of this issue that Secretary Perkins might have this in mind when summoning representatives from six different states for conference.

If it is ruled the Independent telephone industry is subject to the Wage and Hour Law then there is only one of two things that can possibly happen —either many companies will have to close their doors and go out of business or State Regulatory Commissions will have to approve rate increases for thousands of small and medium-sized companies. For industries other than the utility business it is a comparatively simple matter to meet requirements of the Wage and Hour Law as prices of their goods can be increased to produce the income necessary to raise wages. However, it is a different problem for utilities for State Commissions must give permission to raise rates in order to pay any increase in operating costs.

If this law does apply to the Independent industry it would seem the sole responsibility for making it possible for thousands of telephone companies to continue in business is that of State Regulatory Commissions and they certainly should prepare to consider favorably petitions for increased telephone rates. The day of increasing the costs of rendering telephone service on one hand and cutting income by reduction and elimination of exchange and toll rates and miscellaneous charges on the other hand is over. We believe if State Commissions do not take definite steps to protect the financial stability of telephone companies, they are certain to receive severe and drastic criticism and condemnation from the public when it is no longer possible for telephone companies to render service.

The problem of continuing to render quality telephone service with today's ever increasing operating costs and decreasing revenues brought about by reduction of rates and miscellaneous charges is a serious one and State Commissions are the only ones that can solve the problem and give long needed relief.

A good place for them to start is with the approving of petitions for rate increases to provide income to meet the requirements of the Wage and Hour Law. They are bound to receive many such petitions.

In discussions with various telephone executives not one criticism was made of the effort to increase wages of telephone employees. We believe that the majority of Independent telephone executives are in favor of better wage conditions for employees, but they realize that it is just impossible for wages to be raised without an increase in their income to provide necessary revenue to make wage increases.

Kentucky Company Sues REA

Buzzing and humming—instead of words—came out of receivers of the Holland (Ky.) Telephone Exchange after the Tri-County Electric Membership Corporation erected its lines in Allen County to provide farm houses with lights, it was charged last week in a suit for $500 damages filed at Scottsville. The plaintiff was R. O. Meador, owner of the exchange, who said the noises were such a nuisance that he had to suspend service.

TELERING

Only ONE Contact!
Price $44.00
F. O. B. factory

For better and cheaper ringing.
No Radio Interference
30-day free trial
TELKOR, Inc.
ELYRIA, OHIO
(See our space in next month's issue)

$1.00 PER YEAR

WILL PROVE EACH OF YOUR OPERATORS WITH A FRESH CLEAN

"Cope"

SANITARY PAPER NECKBAND EVERY DAY!

WITH THE HANDY DISPENSING CABINET AND QUICK-ACTION SUREGRIP CLIPS, YOU CAN ADD IMMEASURABLY TO YOUR OPERATORS' COMFORT AT SURPRISINGLY LOW COST.

ASK YOUR SUPPLY HOUSE OR WRITE DIRECT FOR SAMPLES AND PRICES.

T. J. COPE, INC.
6122 VINE STREET
PHILADELPHIA, PA.

Did You Forget?

— that when you need good telephones for those new subscribers this Fall

—your best buy is to send in old parts to Suttle to be manufactured into the kind of instruments you want

— with savings running from 20% to 50%.

Remember—

to check up on the Suttle Catalog—It pays

SUTTLE EQUIPMENT CO.

LAWRENCEVILLE, ILLINOIS

World's Fair Building Approved

A model showing the general exterior design of the Bell Telephone System building at the New York World's Fair in 1939 has been approved by Walter S. Gifford, president of the American Telephone and Telegraph Co., and by Grover R. Whalen, president of the Fair Corporation.

The building on which work has now been started will occupy a triangular plot of slightly more than three acres immediately north of the Theme Center; formal entrance is through a pavilion at the point of the plot adjacent to the Theme Plaza.

(*Note*: Picture of the building was carried in your May TELEPHONE ENGINEER.)

Obituary

Word has been received of the death of Fred E. Bentley, for forty-seven years superintendent of the telephone and telegraph department of the Union station in St. Louis, Mo. He died in Circle City, Alaska, where he was on a vacation trip. He was born in Griggsville, Pike county, sixty-nine years ago.

Herbert J. Brouwer, office manager of the Grand Rapids branch of the Michigan Bell Telephone company, was drowned July 13 at Grand Rapids.

Remus Ford Harvey, 76, who developed and managed the Woodbury (Conn.) Telephone Co., was independent concern, for 25 years, died at his home in Woodbury, July 15, after an illness of two weeks. He was stricken with a heart attack.

John M. Parrett, 65, treasurer and general manager of the Princeton (Ind.) Telephone Company, died at a hospital in Battle Creek, Mich., on August 4. M. Parrett is survived by his widow two sons and a daughter.

Curtis H. Rottger, member of the board of directors and former president of the Indiana Bell Telephone Company, died unexpectedly, July 31, in his home 3103 North Meridian street. He was 74 years old.

Phil M. Watson, 63 years old, secretary and treasurer of the Indiana Bell Telephone company, died of heart disease, on Aug. 9, in his country home north of Indianapolis. He was a member of a pioneer Indianapolis family.

D. H. Whitman, 62, of Indianapolis, Ind., general contract agent of the Indiana Bell Telephone Company, died July 17, following a month's illness.

J. L. Spellman Dies

John Lawrence Spellman, publicity manager of the Illinois Bell Telephone Company, died Saturday night, August 13, 1938, in his home at 424 Melrose street after an illness of two months. Death was due to a heart attack. He would have been 54 years old on August 30. He was a former newspaper reporter.

Mr. Spellman was born in Chicago, and educated in the public and parochial schools. In 1920, he became publicity manager for the telephone company, holding that place until his death.

His widow, Walburga, and five sons, William J., Robert J., John L., II., Harry T. and Edward C. Spellman, survive.

Mansfield Company Completes Program

What is hailed by company engineers as the largest single expansion step in Mansfield (Ohio) telephone history was virtually completed July 30.

The program, which culminates more than a year of plant expansions, rep-

STEEL STRAND ◆ TELEPHONE WIRE

Crapo

GALVANIZED PRODUCTS

SCIENTIFICALLY MADE TO MEET SPECIFIC DEMANDS

Crapo Galvanized Steel Strand is produced from start to finish to meet the specific demands of the service for which it is intended. Each wire used in forming a particular size and grade of strand is made from the same special steel, scientifically processed in the same way, uniformly galvanized by the *Crapo* Process. The tough, heavy, pure zinc galvanized coating, tenaciously bonded to the wire by the *Crapo* method, withstands the abuse of construction, provides lasting protection.

Crapo Galvanized Strand and *Crapo* Galvanized Telephone Wire constantly are setting new records for long, economical life and low maintenance costs. Ask your Jobber, or write direct!

INDIANA STEEL & WIRE CO.
Muncie, - - Indiana

resents an outlay of $250,000, LeRoy Wittemire, general manager of the Mansfield Telephone company, said.

The improvements include:

1. A $35,000 Woodland sub-station with automatic switching equipment.

2. A $15,000 addition to the present

2. A $15,000 addition to the present central office on Park avenue west.

3. Extensive underground improvements including 10 miles of conduit and cable representing an expenditure of $200,000.

R. J. McCabe Selected By Indiana Steel & Wire

R. J. McCabe has been appointed manager of sales, electrical materials, for the Indiana Steel & Wire Company, Muncie, Indiana. Announcement of the appointment is made by Fred M. Crapo, vice-president and general manager.

R. J. McCABE

Mr. McCabe becomes associated with the Indiana Steel & Wire Company after nearly 30 years' service with the Western Electric Company and Graybar Electric Company. He joined Western Electric at Dallas, Texas, in 1909 and served successively in St. Louis, Kansas City and Florida. In 1927, he became service manager of the Boston office of the Graybar Electric Company and in 1932 was made New England district manager. He is a member of the Metropolitan Electric League of Boston, Telephone Pioneers of America, New England Railroad Club and the Engineers Club of Boston.

In his new connection, Mr. McCabe will direct the sale of Crapo Galvanized telephone wire, steel strand and other products, to the telephone field.

Jamestown Company Runs Unique Ad

In the Jamestown (N. Y.) Post on the morning of July 26 there appeared a full 3 column advertisement of the Jamestown Telephone Corporation that is receiving wide spread attention throughout the United States.

It consists of a story, written by George T. Trundle, Jr. of the Trundle Engineering Co., Cleveland, Ohio, who believes that the public is missing one of the best sales opportunities of modern times in not consistently selling our products and services—instead of listening to 'hard times' stories.

The homely philosophy of Mr. Trundle is demonstrated in the closing paragraph of his dissertation: "So—If you sell hot dogs...and they are GOOD hot dogs...I say, 'Go out and sell 'em'".

"Fool Proof" Hoist

What is said to be the most "fool-proof" hoist ever offered industry has been developed by Coffing Hoist Company, Danville, Illinois. It is called the Coffing "Safety Pull."

Newest of the many safety features is the Push Button Control. When the load has been elevated and it is desired to lower the hoist, the operator simply pushes in the button and hoist's action is reversed. This control also acts as a safety stop; if the worker's hand should slip off the handle while operating, this device automatically and positively locks the handle before it can revolve or cause any damage. Two other safety stops prevent handle from whirling around and causing injuries to workmen.

Coffing "Safety Pulls" are made for loads from ¾ to 15 tons, weighing from 15 to 150 lbs. Each hoist is factory tested to lift 100% overload.

United Telephone Plan Approved

Washington, Aug. 1.—A reorganization plan of United Telephone & Electric Co., which operates in Kansas and Nebraska, was approved today by the Securities and Exchange Commis-

A NEW

4 FREQUENCY MOTOR GENERATOR

This Machine has no moving conductors.

Requires neither brushes or collector rings.

Low cost maintenance.

Low current consumption.

Output 25 watts.

Can be furnished for A.C. or D.C. drive or both.

Can be equipped with tone, and machine ringing interrupters.

For Complete Information, Write

THE HOLTZER-CABOT ELECTRIC CO.

125 Amory St. BOSTON, MASS.

6161 So. State St. CHICAGO, ILL.

The Clearing House

For the convenience of readers of Telephone Engineer

Time Clocks

Specialists in Reconditioning
WATCHES & CLOCK CONTROLLED DEVICES FOR SPECIALIZED TELEPHONE APPLICATIONS

Parts for obsolete equipment made to order

Send for list of Rebuilt watches and Clock controlled instruments

GENERAL TIME SERVICE
1507 W. Vliet St. Milwaukee

Accounting Systems

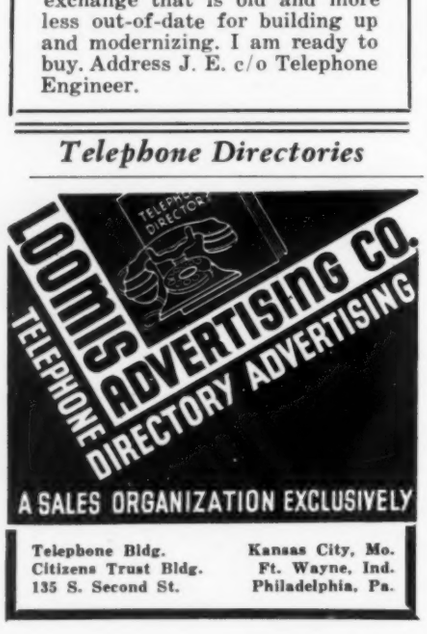
Bowdle Accounting System
A complete Accounting Service For Telephone Companies.
Box 642
WHEATON, ILLINOIS

Engineer-Construction

R. S. SHELY
CONSTRUCTION ENGINEER
LIGHT-POWER-TELEPHONE LINES
SWITCHBOARDS AND CABLES INSTALLED
20 YEARS ACTIVE EXPERIENCE
330 Dudley Road Lexington, Ky.

WANTED TO BUY—Telephone exchange in small town of up to 2500 population, preferably some exchange that is old and more less out-of-date for building up and modernizing. I am ready to buy. Address J. E. c/o Telephone Engineer.

Telephone Directories



Telephone Bldg. Kansas City, Mo.
Citizens Trust Bldg. Ft. Wayne, Ind.
135 S. Second St. Philadelphia, Pa.

sion.

Details of the plan were not available, the commission explaining that they would be forthcoming within a few days.

The plan had been filed by the company's reorganization managers, Louis R. Gates, R. W. Samuelson, Ira C. Snyder, Donald L. Pettis and A. Z. Patterson.

Murray Makes New Anchor

Illustrated here is the new Murray Earth Cone Guy Anchor now manufactured by D. J. Murray Mfg. Co., Wausau, Wisconsin. It is designed for line anchorage, and is made of strong high-grade cast iron, with black paint finish, in various sizes to meet requirements. Inside the cone are beads that strengthen the anchor, and square segments that lock the nut on the guy rod.

Kearney Promotes Two Executives

The Board of Directors of the James R. Kearney Corporation, St. Louis, manufacturers of overhead and underground utility equipment, have announced that Lloyd L. Crump, Assistant Chief Engineer, and Joseph D. Hoffman, Sales Department, have been elected to offices of Vice-Presidents of the company, effective July 1, 1938.

Mr. Crump is a graduate Electrical Engineer from the University of Missouri and has been actively associated with the Electrical Industry for the past twenty-five years in capacities of appraisal, distribution, and standards and specifications engineer of a prominent power company. He is Secretary of the St. Louis Section of A.I.E.E. 1937-1938; Secretary of the Technical Committee of the Distribution Cutout Group of N.B.M.A.; Associate Member of the Distribution Cutout Group of N.E.M.A. and Power Switching Equipment.

Poles

Carney
CEDAR POLES
Plain or Butt Treated
B. J. CARNEY & CO.
100 No. 7th St. Minneapolis

Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

Telephone Directories

Telephone Directory
ADVERTISING
Write or Telephone for proposition
L.M.BERRY & CO.
Call L.D.16 - Telephone Bldg., Dayton, O.

Telephone Engineers

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
105 West Adams Street
CHICAGO

J. W. WOPAT
CONSULTING ENGINEER
Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations
303 East Berry Street
Fort Wayne, Indiana

SITUATION WANTED — Telephone Man wants position. 17 years experience as lineman, head lineman, installer, sub station and P. BX of all types. Has technical and practical knowledge of teletypewriter and repeater circuits. Also know Railroad Dispatching and Tel. Systems. 35 years old and free to travel. References. Answer: F. T. Crowley, 2 Russell Ave., Nashua, N. H.

The Clearing House

For the convenience of readers of Telephone Engineer

CENTRAL OFFICE PROTECTION

◆

W. E. Co. No. 1168—1169
W. E. Co. No. 1268—1269
W. E. Co. No. 1078—A

Protector Groups

W. E. Co. No. 1435—U
W. E. Co. No. 1435—T
W. E. Co. No. 1435—R&Y

◆

Buckeye Telephone & Supply Company
COLUMBUS, OHIO

RECONSTRUCTED EQUIPMENT

Kellogg No. 301E 500 ohm drops and jacks 10 per strip @	$16.00
Double pole 15 Amp double throw knife switches @	.20
Stromberg Carlson No. 896 3-bar pony type 1000 or 1600 ohm ringer compacts @	8.75
Kellogg No. 115 dask type Grabaphone with 3 Cond Cord less signal set	4.75
Leich Elec. 5-bar 1600 ohm ringer compacts @	8.75
Schawrze loud ringing Ext Bell with 6 inch gongs @	6.75
L. M. Ericsson Slip type Receivers with Repolished shell & New cord	.75
Western Elec. No. 20 AL desk set with No. 138 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @	8.50
Western Elec. No. 22C Latest type Shutter drops and jacks per strip of 5	8.75
Western Elec. No. 20 Central Battery Ind. Coils @	.35
Western Elec. No. 21D 2 M. F. Condensers @	.35
Stromberg Carlson No. 5C Repeating Coils @	1.50
Standard Swbd. Lamps 22-24 or 48 Volt Per 100	4.50
Western Elec. No. 12B Central Batt. Trunk or Toll Ckt Repeating coil	1.50
Monarch No. 33 desk set complete with 3-bar 1000-1600 or 2500 ohm ringer inside connection signal set @	7.85

REBUILT ELECTRIC EQUIPMENT CO.
1934 West 21st St., Pilsen Sta.
Chicago, Ill.

Mr. Hoffman who joined the Kearney Corporation ten years ago had spent three years in the telephone field before becoming actively engaged with the Power Industry. His first association with the company was spent in design equipment.

In 1932, he was transferred to the Sales Department in which he has acted in the capacity of Assistant to the Executive Vice-President, James R. Kearney Jr.

Mr. Hoffman is a graduate Electrical Engineer of the University of Missouri and a member of the St. Louis Electrical Board of Trade.

A New Four Frequency Ringing Motor-Generator

The Holtzer-Cabot Electric Company has recently developed a 25 watt four frequency ringing motor-generator set. They claim it is unsurpassed for trouble free performance. This machine is applicable to harmonic party line installations using ringing frequencies of 16.6, 33.3, 50 and 66.6 cycles.

The four frequency generator is a two bearing machine of the inductor type, requiring no brushes or slip rings. This type of construction is made possible by the use of rotating permanent magnets made of "Alnico" the well known powerful magnetic material.

The driving motor is of the well known Holtzer-Cabot design and rugged construction. The motor is equipped with a speed governor, to hold the set to an even speed, giving close frequency regulation. The power input to drive the set is low.

The sets can be obtained with a motor designed to operate from single phase commercial power supply or with a motor to operate from storage battery supply or the sets can be arranged with an AC motor on one end of the four frequency generator and a DC motor on the other end. Because of the simplified design the sets are quite reasonably priced. The set can be furnished equipped with tone and machine interrupter equipment at a slight additional cost.

Installations requiring a fifth frequency of 25 cy. can use this set and add a dynamotor with governor control. The dynamotor however can only be operated from the storage supply.

(Picture in adv. on page 43)

Classified

FOR SALE

Due to change in methods of billing, we offer for sale—
One Burroughs Moon-Hopkins Style 7603 Billing Machine; One Burroughs Moon-Hopkins Style 7200 Billing Machine. Each is electrically operated and is equipped with stand. Address requests for price to The Mansfield Telephone Company, Mansfield, Ohio.

POSITION WANTED — Telephone circuit and transmission man. Training and experience with Bell, 8½ years in Chicago loop; Armour Tech.; and a writer of articles for this magazine. Able to test and adjust automatic equipment, switch boards, improve transmission, construct repeaters, sound systems; and radio apparatus. Have own test equipment and tools. 37 years — married, will move. Address C. A. R. c/o Telephone Engineer.

SPECIALISTS IN
Rebuilding and Repairing
TRANSMITTERS
Grounded Transmitters Made Metallic

Western Electric grounded type of transmitters, black enameled and rebuilt into metallic late style with full floating diaphragm similar to the No. 323 or No. 337 transmitters ..... $ .80

We guarantee to improve the transmitter 3 decibels and lower the battery consumption by 20% on all such transmitters we rebuild. A trial order solicited, with money-back guarantee that the work must be satisfactory or may be returned at our expense.

Metallic type of transmitters, completely rebuilt, each ..... .50

Full information on request.

SPECIAL
AUTOMATIC ELECTRIC DIAL PHONES

Automatic Electric Co. No. 21 type off-center desk stands, arranged and wired for, but less dial, ea..... $ 4.50

Automatic Electric Co. enclosed gong steel ringer boxes with booster circuit, straight line ringers, ea..... 5.00

For the set 9.00

Western Electric rebuilt No. 1317 magneto wallphones, 5-bar, No. 48 generator, 1600 ohm or 2500 ohm No. 38 ringer 12.00

2 cell metal battery cans @..... .75

Standard size galvanized 3-bolt clamps slightly used but good as new at less than half-price..... .15

Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

PUTTING RARE GASES TO WORK

THE VINCENT RARE GAS RELAY

On rural party lines cuts out inductive interference, improves transmission; used with either coded or harmonic bells. EASY to install.

RARE GAS ARRESTERS

Avoid interruptions to service and provide full protection. Keep your lines clear and reduce maintenance expense. Interchangeable with other types.

TEST-O-LITE

Handiest electrical tester made; quickly locates trouble in electric circuits, fuses, cut-outs, motors, radios, etc. 1,001 uses for electricians. Tests any voltage 110 to 550; tells A.C. from D.C. Fountain-pen size; with pocket clip. Lifetime guarantee.

L. S. BRACH Mfg. Corp.
NEWARK, N. J. - Estab. 1906
Oldest Makers of Rare Gas Devices

DRILLS HOLES IN CONCRETE
FOR EXPANSION BOLTS, CONDUITS, ETC.

WODACK "DO-ALL"
This is the electric hammer that can be changed to a drill for metal and wood. Two sizes. Ask for prices.
Wodack Elec. Tool Corp. 4637 W. Huron St. CHICAGO, ILL.

PREVENT POLE FIRES!
BURN WEEDS AND GRASS FROM AROUND POLES

UNIQUE NO. 500C

2000° FLAME 3x30"

EASY TO USE

WEED BURNER

The simple quick-starting burner is made with a coil of seamless steel tubing; burns 1½ gal. kerosene or light distillate per hour.

Four gallon welded steel tank is equipped with powerful pump, funnel filler, pressure gauge, and shoulder strap. 7 feet of oil resisting hose connects tank and burner. Burner weight 5 lbs. Shipping weight 21 lbs. Price $19.50.

UNIQUE MANUFACTURING CO., Inc.
221 W. Walton St. Chicago, Illinois
FURNACES—TORCHES—BURNERS

Index to Advertisements

A

Albertson Electric Co. —
Allen Electric Co. —
American Coach & Body Co. —
American Steel & Wire Co. —
American Tel. & Tel. Co. 8-9
Automatic Electric Co. 22-23

B

Bartlett Mfg. Co. —
Bashlin, W. M., Inc. —
Bell Lumber & Pole Co. —
Berry, L. M. 44
Bethlehem Steel Co. 11
Bowdle Accounting System 44
Brach, L. S., Mfg. Co. 46
Brown Wood Preserving Co. —
Buckeye Telephone Supply Co. 45

C

Calculagraph Co. 10
Carney & Co., B. J. 44
Chance Co., A. B. —
Churchill Cabinet Co. 2
Coffing Hoist Co. —
Colonial Hotel 35
Communication Equipment Engineering Co. —
Cook Electric Co. 40
Cope, Inc., T. J. 41

D

Davey Tree Expert Co. —
Dillon Mfg. Co. 47

E

Electric Storage Battery Co., The 35
Everstick Anchor Co. —

F

Forged Steel Products Co. —
Four Wheel Drive Auto Co. —

G

Gardiner Metal Co. —
General Motors —
General Time Service 44
Gould Storage Battery Corp. —
Graybar Electric Co. 39
Grobet File Corp. —

H

Habirshaw Div., Phelps Dodge Copper Products Corp. —
Harding, Wm. —
Herdrich & Boggs —
Holtzer-Cabot Electric Co. 43
Hubbard & Co. —

I

Indiana Steel Products Co. —
Indiana Steel & Wire Co. 42
International Crossarm Co. —

J

Johns-Manville —

K

Kearney Corp., Jas. R. —
Kellogg Switchboard & Supply Co. 4-5
Klein, Mathias & Sons —
Koppers Company —

L

Leich Sales Corp. 14
Lenz Electric Mfg. Co. —
Loomis Advertising Co. 44
Lorain Products Corp. 35

M

Mansfield Telo. Co. 45
McCreary, Harold J. —
Michigan Pole & Tie Co. —

N

National Carbon Co. 6-7
National Telephone Supply Co. 47
North Electric Mfg. Co. 48

O

Oliver Iron & Steel Corp. —
Owens-Illinois Glass Co. —

P

Phelps Dodge Copper Prod. Co. —
Phillips Electrical Works Ltd. 39
Potosi Tie & Lumber Co. —
Premax Sales Division —
Prentice-Hall, Inc. —

R

Ray-O-Vac Co. —
Ready Mfg. Co. —
Rebuilt Electric Equipment Co. 45
Reliable Electric Co. —
Russell, C. B. —
Runzel Cord & Wire Co. —

S

Seymour Smith & Sons, Inc. —
Shallcross Mfg. Co. —
R. S. Shely 44
Siemens Bros. & Co., Ltd. 28-29
Signaphone Corp. —
South Bend Lathe Works —
Stromberg-Carlson Tel. Mfg. Co. 13-33
Sundt Engineering Co. —
Suttle Equipment Co. 42

T

Telkor, Inc. 41
Telephone Repair Co. 45

U

Unique Mfg. Co. 46
Union Carbide & Carbon Co. 6-7
United Motors Service, Inc. —
U. S. Steel Corp. —
Utility Tool & Body Co. —

V

Valentine & Clark Corp. 44

W

Western Electric Co. 37
Whitney Blake Co. 35
Wodack Electric Tool Co. 46
Wood Preserving Corp. —
Wopat, J. W. 44
Wray, J. G., & Co. 44

Y

Yale & Towne Mfg. Co. —

THE PACE!

NINE years ago, Kellogg introduced the first modern, streamlined telephone. Since that time others have followed. Kellogg has consistently set the pace.

This foresight is greatly responsible for the position and soundness of the industry today. It brought about the merchandising of telephone service.

Kellogg Masterphones not only established the design trend, but pioneered most of the other things which have resulted in better telephones from an efficiency, operation and maintenance standpoint.

KELLOGG SWITCHBOARD AND SUPPLY COMPANY . . . CHICAGO